DISEASE, DEPOPULATION, AND CULTURE CHANGE IN NORTHWESTERN NEW SPAIN, 1518–1764

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some with ball courts, platform mounds, altars, and earth pyramids. Through the use of a variety of agricultural techniques, ranging from simple floodwater farming to canal irrigation, many communities were able to exceed subsistence requirements and were able to support craft production and trade. It also is evident that native settlements often were governed by elites with differential access to and control of productive and organizational strategies and who wielded substantial political and military influence. In many areas native peoples were organized into chiefdoms. There is no shortage of evidence that native populations throughout the Greater Southwest also had sophisticated religious systems to cope with the uncertainties of life. These uncertainties, however, did not include acute and chronic infectious diseases like smallpox or malaria, which necessarily called into question many aspects of aboriginal culture.

CHAPTER 3
DISEASE EPISODES IN NORTHWESTERN NEW SPAIN

THE HISTORICAL RECORD AND THE EVIDENCE OF DISEASE

During the sixteenth and seventeenth centuries disease generally was viewed as a form of divine punishment, effected as it were through bad air (mala aria = malaria in Italian) or celestial events such as comets or planetary conjunctions (Beveridge 1978:24; Cooper 1965:195; Crosby 1972:43; Florencia 1955:257-58; Ionides and Ionides 1939; McNeill 1976:184; Russell et al. 1943:2). Not only were the causes of disease misunderstood, but maladies such as smallpox and measles often were confused. Still other diseases were considered the same malady, typhoid or cholera, or leprosy, and malaria with dysentery (Ashburn 1947:92; Cooper 1965:193; Dixon 1962:68; Peter 1973). This confusion and failure to differentiate diseases reflects the fact that, superficially, many diseases have a similar appearance. More importantly, epidemics of a single malady were infrequent during the early historic period; circumstances such as malnutrition that favored the spread of one disease also favored the spread of others. It was thus quite common for several diseases to afflict populations simultaneously (Busvine 1976:53; Crosby 1972:43).

Although Europeans writing in the sixteenth and seventeenth centuries largely were ignorant of disease pathogenesis, the Jesuits and other Spanish colonial observers often commented on the clinical symptoms that characterized disease episodes. By focusing on observations regarding fever, stomach and back pains, hemorrhaging, rashes, bloody stools, etc., and then comparing these observations with modern medical knowledge, frequently it is possible to identify or confirm reports of smallpox, malaria, or other diseases. Though some have questioned the
use of this strategy on the grounds that diseases have changed in the past three or four centuries (e.g., Ramenofsky 1987:137–38), clinically speaking, measles, smallpox, and other maladies have changed only slightly. As we will see, sixteenth-century accounts of diseases such as quaran malaria are strikingly similar to modern clinical descriptions of the disease.

With a knowledge of disease pathogenesis and epidemiology it also is possible to infer how epidemics may have originated and spread. Only occasionally did Spaniards writing in the sixteenth or seventeenth century understand and comment on the origins or spread of disease. In 1593, for instance, Father Gonzalo de Tapia alluded to the spread of smallpox from Michoacan to Sinaloa: “We have all been very busy in baptizing all the dying and burying them, for the pestilence which took those who died in Michoacan is widespread here” (Shields 1934:142). Rarer still were comments like De León’s (1909:148) regarding a boy who contracted smallpox in New Spain in 1646 and brought the disease to the villa of Cadereyta, whence it spread throughout Nuevo León.

Although Europeans and Amerindians alike largely were ignorant of how diseases originated and spread, by the late 1700s experience had shown that epidemics in northern New Spain invariably began in central Mexico (e.g., Treutlein 1949:217–18). Despite tremendous early losses, the native population of central Mexico remained large and well integrated throughout the colonial period and thus served as a reservoir of disease agents. The annual treasure fleet or flota, which left Spain in May and reached Veracruz in five or six weeks (Elliott 1989:19), continually replenished the reservoir with new microorganisms from Europe. Thus, within a decade or two of the Conquest, many diseases became endemic or semiendemic in central Mexico, occasionally reaching epidemic proportions when conditions were ripe (Cooper 1965; Gibson 1964; Ocaranza 1934). Significantly, often within a year or two of an epidemic in central Mexico, the diseases that were involved reached epidemic proportions in northwestern Mexico. Many such epidemics in the north actually are represented in the historical record by isolated reports and references to communities or individuals suffering from disease. Frequently the researcher must determine whether these reports reflect a true epidemic and, if so, where the epidemic originated and how it spread from one community or region to another. To arrive at reasonable inferences regarding the transmission process it is necessary to know how particular diseases are transmitted, what the incubation period is for different maladies, and how long an infected host can shed a given virus, parasite, or other disease agent. These medical facts must then be coupled with a knowledge of Spanish and Indian exchange systems, which were the principal routes of contagion during the early historic period in the Americas (cf., Cook 1959a:944).

Practically speaking, a knowledge of disease pathogenesis and epidemiology is a prerequisite for interpreting documentary reports and references to disease. We are fortunate in this regard that the Jesuits produced a voluminous commentary on life in northern New Spain. Ironically, because disease was so common, the Jesuits often made only passing reference to disease episodes and their consequences, not wanting, as they phrased it, “to repeat similar cases” (Pérez de Ribas 1944:1. 285). Still, the Jesuit materials are an invaluable data source, particularly as compared with the documentary sources for the period from 1520 to 1590. During this earlier period there was a relatively small number of Spaniards, primarily explorers and later miners, who were in a position to observe and comment on the possible northward spread of disease from central Mexico. Unfortunately, relatively few of these Spaniards were literate. Because of the paucity of material from the pre-Jesuit period, we often must rely on indirect evidence to determine whether northwestern Mexico was affected by epidemics that are known to have exacted a heavy toll in central Mexico during the decades immediately following the fall of Tenochtitlan. This is true of the smallpox epidemic that raged at the time of the Conquest of Mexico and which subsequently reached pandemic proportions, affecting large numbers of natives in a wide geographic area.

PRE-JESUIT EPIDEMICS, 1518 TO 1591

The Smallpox Pandemic of 1518–25

At the time of the pandemic, smallpox already had killed countless millions in the Old World. Indeed, repeated exposure to the disease during the millennium preceding the Conquest provided more European populations with sufficient resistance to varicella, the virus responsible for the disease. Accordingly, at the time of Columbus’s fateful journey, smallpox was largely a childhood affliction in Europe. It was with great surprise, therefore, that many Spaniards noted that smallpox killed large numbers of Amerindians, young and old alike. Europeans, in general, commented that smallpox was unsurpassed when it came to claiming native lives (e.g., Treutlein 1949:219). Even in the late 1800s—several centuries after smallpox was brought to the Americas—the
disease swept through Indian communities in the United States, killing between 55 and 90 percent of those who contracted it (Ashburn 1947; Crosby 1972; Shurkin 1979; Stearn and Stearn 1945).

Because the smallpox pandemic of 1518–25 was a "virgin soil" episode, affecting entirely susceptible populations, the loss of native life was phenomenal. The pandemic apparently began during the winter of 1518–19 on the island of Santo Domingo, where it quickly destroyed approximately 30 percent of the island's population. The smallpox virus subsequently spread to Puerto Rico, Cuba, and throughout the Greater Antilles. In 1521, smallpox was carried from Cuba to Mexico by a black soldier who was part of an expedition sent by Governor Velasquez to arrest Cortés for his unauthorized march on Tenochtitlan. Once ashore, smallpox raced inland, arriving at Tenochtitlan before Cortés and his would-be jailers paid a second visit to the Mexico capital. An effective fifth column, smallpox ravaged Tenochtitlan's defenders, enabling Cortés and his followers to capture the city (Crosby 1972:47–58; Dobyns 1963:494–95; Pacheco y Cárdenas 1864:367–68; Sauer 1969:205).

Even before the city fell, smallpox spread to distant parts of the Aztec empire as well as to Michoacán. Ambassadors of the Tarascan king who visited the besieged Tenochtitlan reportedly brought the disease back to Michoacán (Graine and Reindrop 1970:65–68). About the time the people of Michoacán suffered, smallpox appeared in the Yucatán Peninsula (Landa 1941:42) and Guatemala (McBryde 1940; Recinos 1953:115–16). By 1524, smallpox had reached Panama, and a year or so later, the disease spread down through the Inca empire (Figure 8). There, too, countless natives perished and the fabric of Indian society was irreparably damaged (Gieza de León 1959:52, 252–53; Crosby 1967; Dobyns 1963; Dobyns and Doughty 1976:61–62).

Our knowledge of the spread of smallpox between 1518 and 1525 is in many instances fortuitous. Were it not for native historians or perceptive Spaniards who recognized and commented on the aftermath of the pandemic, we probably would be ignorant of the fact that areas like Michoacán or Yucatán were affected by the disease episode. One might readily suppose that the pandemic affected areas adjoining Mesoamerica and Peru that were unknown at the time to Spaniards and where the native population lacked writing or another more permanent means of recording the effects of disease.

Smallpox is by nature a highly contagious disease and is readily transmitted in respiratory discharges from individuals who have contracted the disease and who are in the two-week postincubation period of infectivity. Pregnant women also can pass the disease on to their infants in utero (Downie and McCarthy 1954:196). The food, bedding, clothing, or other possessions of smallpox victims as well as the smallpox corpse itself also can harbor varicella. Experiments have shown that scabs from a single smallpox case, when stored in raw cotton at room
temperature for 330 days, still retain viable virus (Dixon 1962:304).
Experiments of this kind give credence to reports of raw and finished
coconut serving as smallpox vectors (Cook 1939; Deuchmann 1961:7;
Dixon 1962:303–7; Stearn and Stearn 1945:44). In 1837, for example,
the Mandan of the upper Missouri were largely destroyed during an
epidemic that apparently began after a Mandan stole a blanket from a
steamboat watchman suffering from smallpox (Jensen 1972).

Although direct evidence is lacking, several researchers have
suggested or implied that the smallpox pandemic of 1518–25 spread
at least as far north as the American Southwest (Dobyns 1983:12–13;
Nixon 1946:53; Upham 1986). Upham has suggested that varioia may
have been carried great distances through aerial convection. There is little
empirical evidence, however, to support this theoretical possibility;
modern research on smallpox suggests that aerial convection is, at best, a
remote possibility (see Dixon 1962:307–9). Henry Dobyns has for
warded a more reasonable hypothesis, namely that varioia spread north
ward from the Caribbean and central Mexico via native trade networks.
Dobyns has pointed out that native peoples such as the Calusa of
Florida regularly traveled by canoe to Cuba to trade. A Calusa trading
party that made such a journey during the pandemic of 1518–25 could
readily have returned to Florida with smallpox, whence the disease spread
northward.

While Dobyns's trade hypothesis cannot be discounted, the archaeo
logical and historical records suggest that native exchange networks did
not facilitate the spread of smallpox into northwestern Mexico. Specifically,
while it is true that native peoples throughout the Greater South
west were engaged in local and long-distance exchange at the time of
the Conquest (cf., Ford 1983; Riley 1976), there is little or no evidence
that this commerce involved regular exchanges with populations in the
Valley of Mexico, Michoacán, or other areas of Mesoamerica. The
Chalchihuites folk, who are thought to have had close economic ties
with Mesoamerica, withdrew from Durango and southern Chihuahua in
the fourteenth century (Kelley 1980, 1981; Weigand 1981). It does not
appear that the Azttec pochteca subsequently revived long-distance trade
with populations in Durango or other serrano areas. (Acosta Saines
1945; Rees 1975). At the time of the Conquest, the Chichimecs in
Querétaro were staunch adversaries of the Mexico and successfully
had resisted numerous attempts at invasion and conquest (Bancroft
1886:339–46). Even if smallpox penetrated Querétaro, it is unlikely that
the small and widely dispersed Chichimec bands of the mesa central
could have sustained the transmission of variola over a distance of at
least several hundred miles.

Mixteca efforts to open or maintain trade contacts with the Tahua
and other populations to the north of the Río Piaxtla also may have been
blocked by the Tarascans and hostile Chichimecs (Cazitrom 1983;
Kelley 1980; Weigand 1981). In their analysis of the aboriginal popula
tion of central Mexico, Borah and Cook (1963:87–88) nevertheless
suggested that smallpox spread from Michoacán up the western coast of
Mexico during the period from 1518 to 1525. As discussed in the pre
vious chapter, in 1524 Hernán Cortés sent his kinsman, Francisco Cortés
de Buenaventura, to explore the region north of Colima, ostensibly to
confirm reports that the region was rich in gold and pearls. Though
Cortés found little gold or other riches, he returned with reports of rich
densely populated provinces in northern Nayarit and southern Sinaloa.
These reports confirmed in 1530 and 1531, during Nuño de Guzmán's conquest of Nueva Galicia, which pushed the limits of Span
ish exploration as far north as the Río Sinaloa. The numerous eyewitness
accounts of Guzmán's expedition made no mention of recent disease
induced reductions in population. Indeed, the exploration chronicles
indicate that western Mexico was well populated with sophisticated cul	ures (Bancroft 1886:66–64; Carrera Stampa 1955; Pacheco y Cárdenas
1870; Sauer 1948; Sauer and Brand 1932; Weigand 1985:49–50). It
should also be noted that Nuño de Guzmán's interpreters found there
were no Nahua speakers in native communities north of the Río Piaxtla
(Sauer and Brand 1932:57), further suggesting that Mexico trade net
works did not extend into the Greater Southwest.

The explorers' comments further support the idea that smallpox did
not spread much beyond the northwestern boundary of the Tarascan
empire between 1518 and 1525. Like the Mexica, the Tarascans were
bound on the north and west by hostile Chichimec and Jalisco Indians
(López Barreto 1965:29–30). Conflict and animosity presumably
limited contacts between the Tarascans and their neighbors, appar
ently to the point where the northward spread of smallpox was blocked.

Guzmán's Expedition of 1530–31 and the Introduction
of Chronic Infectious Diseases in Nayarit and Sinaloa

Although the native population of western Mexico apparently escaped
the smallpox pandemic of 1518–25, we know that Guzmán's expedition in
1530–31 unleashed several pathogens that had a profound impact on
native peoples in northern Nayarit and southern Sinaloa. As we have seen, Guzmán's expedition left Mexico in December 1529. After blazing a trail of destruction across Michoacán, Jalisco, and southern Nayarit, Guzmán's army in August 1530 reached the Río Acaponeta and the province of Azatlán. A month or so after the Spaniards arrived at Azatlán, a tropical storm inundated Guzmán’s bivouac and the surrounding region, and an epidemic devastated his army (Figure 9).

Although two accounts of the epidemic indicate that some Spaniards became ill (Carrera Stampa 1955:138; Pacheco y Cárdenas 1870:439), it was primarily Guzmán's allies and Tarascan burden carriers who suffered during the epidemic. García del Pilar, who accompanied Guzmán, noted that more than 8,000 allies and *naburias* perished (Carrera Stampa 1955:135). Other eyewitness accounts also mention or allude to thousands dying (Carrera Stampa 1955:108–9, 154; Pacheco y Cárdenas 1870:439). There is reason to believe that the epidemic also spread to native settlements in the province of Azatlán. The author of the Third Anonymous Relación noted that each time Guzmán's men ventured beyond their encampment, apparently in search of food and slaves, they returned with many people who were sick and who subsequently died (Carrera Stampa 1955:138). The author of the First Anonymous Relación also noted that many pueblos in the province of Azatlán were depopulated and that the few natives who survived fled thirty or forty leagues up into the Sierras (Carrera Stampa 1955:154). Before the epidemic, Azatlán had a population of 22,000 (Mota Padilla 1924:105).

Guzmán's army and the inhabitants of Azatlán probably were stricken with several maladies. The clinical symptoms that were mentioned in various accounts of the epidemic include intense fever, chills, bloody stools, and prostration (Carrera Stampa 1955:108–9, 138–39). These symptoms are highly suggestive of dysentery (*Shigella* spp.), typhoid, and/or malaria (Ashburn 1947:92; Cloudsley-Thompson 1976:137; Kitchens 1949:1017). Guzmán's army could have harbored each of these chronic infectious diseases. Dysentery and typhoid were quite common at the time among armies in Europe, where they were considered campaign diseases, and often swept through Europe's finest armies and navies, killing thousands in several weeks' time (Cloudsley-Thompson 1976:137). Roughly 5 percent of those who contract typhoid retain *Shigella* for many years, disseminating the bacteria in their feces. Individuals who contract amoebic dysentery also can harbor the disease for many months if not years (Cloudsley-Thompson 1976:129–31). Interestingly, during the decade preceding Guzmán's conquest, the population of Tlaxcala, whence many of Guzmán's Indian allies were recruited, declined from 500,000 to 250,000, largely as a result of introduced diseases (Gibson 1952:142).

Both dysentery and typhoid are most often spread by contaminated water and food. We know for a fact that the tropical storm that
preceded the epidemic of 1530 inundated Guzmán’s bivouac and the surrounding coastal plain. The tropical storm as well as the heavy summer rains that preceded it also provided an excellent environment for anopheles mosquitoes and malaria. Although some have thought that malaria was present in the New World during pre-Columbian times, historical evidence as well as studies of genetic polymorphism point to an Old World origin for malaria (Crosby 1972; Dunn 1965; McNeill 1976). Different subspecies of anopheles mosquitoes, the only known malaria vector, also may have been brought to the New World (McNeill 1976:186).

The highest incidence of malaria in the American tropics occurs in September and October, when heavy rains and tropical storms frequently create large expanses of standing water that allow anopheles mosquitoes to proliferate (Boyd 1949a:634). Several of Guzmán’s officers (Carrera Stampa 1955:125, 175) as well as many later observers (e.g., Arregui 1946:66; Caudal Real 1976:11, 122; Mota Padilla 1924:118; Mota y Escobar 1940:85–86; Tello 1891:611) complained of the large number of mosquitoes in lowland Nayarit and Sinaloa. While it cannot be determined if these mosquitoes were anopheles, in modern times lowland Nayarit and Sinaloa have been home to *Anopheles albimanus* (Faust 1949:736). This particular subspecies of anopheles mosquito occurs in the lowlands along both the Atlantic and Pacific coasts of North America and was responsible in 1932 for a serious epidemic on the island of Jamaica. Like the epidemic that devastated Guzmán’s army, the epidemic in Jamaica began after a tropical storm closed culverts and standing water accumulated, allowing *Anopheles albimanus* to proliferate (Boyd 1949a:642–43).

There have been numerous instances in which malarial epidemics, some of which have claimed thousands of lives, began after one or more individuals harboring *Plasmodium* entered an area where anopheles mosquitoes and susceptible hosts coexisted in large numbers (e.g., Christophers 1949:707; Harrison 1978:203–7). Interestingly, in his *Memoria*, which was written after the conquest, Guzmán noted that shortly after he arrived in the New World in 1525, he contracted “*tercianas* continuadas y despues cuartanas doble” (Carrera Stampa 1955:40). Although clinical manifestations often are an inadequate basis for distinguishing different types of malaria (cf., Boyd 1949:551), Guzmán’s reference to *tercianas* and *cuartanas* doble undoubtedly denotes quartan malaria. This particular form of malaria, caused by *Plasmodium malariae*, has a distinctive seventy-two-hour paroxysm cycle that results in a fever every third day—what Guzmán and other Spaniards referred to as *tercianas*. Frequently, with infections of *Plasmodium malariae*, the cycle of paroxysms changes with the patient experiencing two days of fever followed by two afebrile days (Kitchens 1949:1017–21). This change in the cycle of paroxysms is apparently what Guzmán referred to as *después cuartanas doble*. Importantly, those who survive a primary attack of quartan malaria frequently retain *Plasmodium* in their blood for many years, and though most rarely exhibit clinical symptoms, they nevertheless are a source of *Plasmodium* that can be readily transmitted to others via anopheles mosquitoes (Boyd 1949a:534; Harrison 1978:117; Kitchens 1949:1017).

While Guzmán apparently did not himself become ill at Aztlán, he did suffer from what may have been a malarial attack some six months or so after the epidemic, while leading a foray into the Sierras above the Rio Culiacán (Bancroft 1886:36–37). Other Spaniards as well as Guzmán’s Indian allies from central Mexico may also have harbored *Plasmodium*. Malaria became endemic in the Caribbean and along the Gulf Coast of Mexico within decades of the conquest (see Aguirre Beltrán 1940:191–92; Thompson 1970:57). Many Spaniards like Guzmán undoubtedly contracted malaria after they reached Venecruz. The historical record from northwestern Mexico contains numerous references to Spanish explorers, soldiers, and priests who suffered from malaria or *tercianas* (e.g., Alegre 1956:144, 152, 161; AGN 16353:379; Carrera Stampa 1955:40; Nieremberg 1889:408, 430; Tello 1891:46–47; Treutlein 1949:213–14).

In sum, it is quite probable that Guzmán’s expedition was a source of malaria, which, along with dysentery and typhoid, swept through his army and the inhabitants of Aztlán. An outbreak of malaria, combined with dysentery and typhoid, would explain the epidemic’s high case frequency and mortality rates. The mortality rate for typhoid reportedly can reach 20 percent among untreated victims of the disease (Cloudsley-Thompson 1976:129). Epidemics of malaria with mortality rates in excess of 30 percent also are well documented. Indeed, before the use of drugs such as quinine or chloroquine, the mortality rate for Europeans during their first year of residence in West Africa was 30 to 70 percent (e.g., Cloudsley-Thompson 1976:98–99). Cook’s (1955) study of the malaria epidemic of 1830–33 in California and Oregon revealed a native mortality rate of 40 to 100 percent, reflecting the complete breakdown of village life and the death of many who might otherwise have survived (Cook 1955:321).

In California and Oregon as well as in other areas of the New and Old worlds, malaria did more than decimate populations—the disease
often made it impossible for populations to recover, both numerically and culturally. This is particularly true of tropical or semitropical areas, where anopheline mosquitoes flourish and where many who survive an initial attack of malaria become reservoirs of *Plasmodium*. Today, as in the past, this reservoir may be pregnant women who unwittingly transfer *Plasmodium* to their infants in utero, causing spontaneous abortion, intrauterine death, and premature birth. Even healthy newborns, who enjoy a passive immunity to malaria for six months, soon after acquire malaria from anopheline mosquitoes. In areas where malaria is endemic, large numbers of infants die before the age of three, while many who live past this age struggle for years with anemia and poor general health. Under these circumstances it is extremely difficult to maintain existing population levels much less recoup earlier losses (Boyd 1940:566; McElroy and Townsend 1979:67–78). It is not surprising, therefore, that by 1542 half the aboriginal population of Nueva Galicia was said to have been destroyed (Bancroft 1886:552). It was not only chronic diseases, however, that exacted a heavy toll; acute infectious diseases also took their toll, as exemplified by the measles pandemic of 1530–34.

### The Measles Pandemic of 1530–34

During the months following the conquest of Nueva Galicia, approximately 100 of Guzmán’s soldiers settled in or about the Villa of San Miguel de Culiacán on the Río San Lorenzo (Bancroft 1884:37–38). Another 100 or so of Guzmán’s followers settled at Chameleta, Compostela, and Nochistlan (Guadalajara) farther to the south. Guzmán’s soldiers generally shunned farming or other worthwhile pursuits and made a living plundering native settlements for tribute and slaves, which were taken south to Mexico along what became known as the camino real of the coast. The regular movement of goods and slaves apparently facilitated the northward spread of measles, which reached pandemic proportions between 1530 and 1534.

If smallpox ranks first among killers of the Amerindian, measles must certainly be viewed as a top contender for the number two position. Prior to the Conquest, measles claimed perhaps as many lives in Europe as did smallpox. It is difficult, however, to compare mortality rates for the two diseases, as both were considered the same malady as late as the tenth century (May 1558:254). Even after they were differentiated, smallpox and measles continued to be confused (Dixon 1962:68; May 1558:254). There was no confusion, however, between 1530 and 1534, when the first New World measles pandemic was reported along with its devastating impact on the Amerindian (Mendieta 1945:174; Ocaranza 1934:148).

Like the earlier smallpox episode, the measles pandemic of 1530–34 exacted a heavy toll in southern Mexico and quickly spread southward to Central America and Peru (Ashburn 1947; Dobyns 1963; McNeill 1976). After raging for several years in Mesoamerica, measles appeared in northern Nayarit and Sinaloa (Figure 10). A Franciscan historian named Tello (1891) is our chief source of information on the epidemic and its consequences. Although Tello did not indicate precisely when the epidemic affected Nayarit and Sinaloa, he did note that shortly after the epidemic subsided, the new alcalde mayor of San Miguel de Culiacán, Cristóbal de Tapia, visited the province, finding many villages wholly deserted, including some where the stench of hundreds of rotting corpses proved unbearable (Tello 1891:250–51). The epidemic must therefore have occurred in 1533 or 1534, about the time Tapia succeeded Diego de Froán as alcalde mayor (Bancroft 1884:59). According to Tello, measles was accompanied by another malady characterized by “bloody stools” (Tello 1891:251–55). Presumably bloody stools denoted dysentery or typhoid (Cloudsley-Thompson 1976:129–31, 136), which apparently were unleashed several years earlier during Guzmán’s conquest of Nueva Galicia. Thousands of natives in the province of Charneta died during the winter of 1533–34 from “bloody stools” and measles. Indeed, so great was the loss of native life, and thus of tributarios, many of Guzmán’s encomenderos left Charneta, abandoning Espiritu Santo and other nearby Spanish outposts. There was a similar exodus from the villa of San Miguel, as two thirds of the residents abandoned the villa for Mexico City and Peru (Tello 1891:254–55).

In his discussion of the epidemic, Tello (1891:250–51) stated that 130,000 natives of Culiacán died during the epidemic, yet it is unclear precisely to whom Tello referred. In one sentence Tello mentions the “costa y valle,” presumably the coast and valley of the Río Culiacán. Subsequently Tello noted that the epidemic left but 20,000 Indians alive in those provinces. This would seem to imply that the entire Tahuac region, including the Rio San Lorenzo and Elota as well as the Río Culiacán and its tributaries (Humaya, Tamazula) were affected by the epidemic.

Although Brand (1971:451–53) has noted a number of omissions, errors, and contradictions in Tello’s work, it is quite possible that Tello’s statements that the epidemic claimed 130,000 lives, leaving but 20,000 natives, are valid. Judging from the accounts of the region compiled by Nuño de Guzmán’s expedition (Carrera Stampa 1953:116–17, 142–43,
154–55), the Tahue may well have numbered over 200,000 in 1531 (see also Geier 1982:260). Recall that at the junction of the Río Humaya and Río Tamazula the invaders found several enormous pueblos, including one that was large enough to quarter an army twice the size of Guzmán's

(Pacheco y Cárdenas 1870:448–49). Below the junction of the two rivers, along the Río Culiacán, the Spaniards reported finding pueblos on both riverbanks for a distance of nine leagues (thirty-eight kilometers), spaced at a distance of three quarters or half a league, and each having from 500 to 600 houses (lazzabête 1866:II, 391; Sauer 1935:7–8). In several towns the Spaniards noted enclosed tianguis or markets that reportedly were comparable to those in Mexico City (Carrera Stampa 1953:125, 156–57).

A large and densely settled virgin population, integrated by markets, would certainly be at great risk during an epidemic of both acute and chronic infectious diseases. Indeed, measles is one of the most communicable of all diseases; even a transient outdoor contact with droplets of mucus or saliva containing rubeola are sufficient to contract measles. Apparently the disease also can be acquired from clothing or other materials that have been infected with the virus, although data are scant on how long the virus can survive outside the human host (May 1958: 267–68).

Measles is both a highly contagious and lethal disease among virgin soil populations. The mortality from measles often was as great as from smallpox among Amerindians (e.g., Ashburn 1947:90–91). Mortality rates as high as 50 percent or more were due to the direct effects of rubeola virus as well as from intercurrent infections. Pneumonia and streptococci flourish in communities stricken with fear and general malaise, as evidenced by recent measles epidemics among the Yanamamo and other populations exposed to measles for the first time (Neel et al. 1970). It must also be kept in mind that the inhabitants of Culiacán suffered from not only measles, but from bloody stools—diabetes and/or typhoid—which increased the mortality rate.

Although difficult to demonstrate, measles and other maladies conceivably spread up into the foothills and Sierras above Culiacán, among the Xixime and Acaxee. The spread of disease may have been facilitated by a native uprising that occurred around the time of the epidemic, during the winter of 1533–34. During the uprising many natives in the province of Culiacán abandoned their villages along the coastal plain and fled up into the foothills and Sierras (Hedrick and Riley 1974:69–70). Disease agents also may have spread to the Sierras via native exchange networks. Both archaeological and historical data indicate that items such as salt, fish, pottery, shell, and feathers were exchanged by serrano populations and the Tahue of Culiacán (Beals 1933; Dunne 1944:47; Kelley and Winters 1963). Recall that Ibarra's expedition found chickpeas at Topia that had been acquired by the Acaxee from Culiacán, presumably through trade (Hammond and Key 1928:67).
One would think that the epidemic of 1533-34 in Sinaloa also affected the Cahita, Guasave, and other groups to the north of the Río Culiacán Valley. The accounts of Diego de Guzmán’s entrada, undertaken during the fall and winter of 1533, do not, however, mention or allude to measles or other diseases affecting populations in southern Sonora. Similarly, neither Cabeza de Vaca nor the authors of the Joint Report who journeyed down through Sonora and Sinaloa in 1536, mentioned Old World diseases. However, the survivors of the Narváez expedition did mention that they encountered many Indians in western Texas and Sonora who were ill (Cabeza de Vaca 1944:43-47; Hedrick and Riley 1974:47-52). With respect to the natives in Texas, the symptoms specifically mentioned by Cabeza de Vaca were headaches, dizziness, and exhaustion or lameness (Cabeza de Vaca 1944:43-45). All three ailments could have been caused by malnutrition and hunger, which were widespread in western Texas at the time (e.g., Cabeza de Vaca 1944:47; Hedrick and Riley 1974:47).

The only specific reference to symptoms in the Joint Report is a curious comment about there being many Indians in western Texas “who were blind, and a great number of one-eyed people, made so by films on their eyes” (Hedrick and Riley 1974:52). Although several researchers (Dobyns 1983:12-13; Nixon 1946:53) have cited this blindness as evidence that the smallpox pandemic of 1518-25 had spread as far north as the American Southwest, the “blindness” associated with benign smallpox is caused by a swelling of the eyelids, making it difficult for the victim to open his or her eyes (Dixon 1962:94-96).

Had smallpox penetrated western Texas or northern Mexico, it is more likely that it would have left facial scars or pockmarks (Dixon 1962:91-95; Schroeder 1972:54; Turel 1949:163), neither of which were mentioned or alluded to by Cabeza de Vaca or the authors of the Joint Report. It seems more likely that the natives who were blind were suffering from trachoma, a disease associated with malnutrition and poor hygiene that produces inflammation of the conjunctiva and cornae (Cloudsley-Thompson 1976; Freyche 1958). Interestingly, Arabs are particularly susceptible to trachoma, and as early as 1500 B.C., the Egyptians had learned to treat the disease with copper sulphate (Cloudsley-Thompson 1976:128-29). Esteban, who was Arabic, conceivably was familiar with this treatment. The use of copper sulphate may account for reports that the three Spaniards and Esteban cured many who were blind (Hedrick and Riley 1974:52).

After they had cured or helped the blind in western Texas, the four Christians were besieged in Sonora by large crowds that asked to be cured and given immunity from disease (Cabeza de Vaca 1944:61-62; Hedrick and Riley 1974:52). Certain statements by Cabeza de Vaca and his companions suggest that many of these illnesses were more imagined than real. Both accounts, for example, indicate that many Indians felt better or recovered immediately after the four Christians blessed, rubbed, or otherwise attended to the sick (Cabeza de Vaca 1944:43, 45; Hedrick and Riley 1974:49, 52). Also, while both Cabeza de Vaca and the authors of the Joint Report mentioned or alluded to the four Christians’ inability to cure some of the sick, there is only one explicit reference by Cabeza de Vaca (1944:45) to an Indian who was ill who subsequently died.

In sum, it does not appear that measles and/or other Old World diseases spread much farther north than the Río Culiacán Valley. At the same time, native peoples in Sonora and other areas of northwestern Mexico appear to have learned of the devastation wrought by disease farther to the south. The mysterious nature and unprecedented consequences of disease undoubtedly aroused great anxiety in Sonora. Because the body does not differentiate between real and imagined threats (McElroy and Townsend 1979:269), many natives who feared becoming ill may actually have suffered some feeling of malaise, which was alleviated by the survivors of the Narváez expedition.

In citing the testimony of Cabeza de Vaca and his companions a question that readily comes to mind is whether the explorers themselves were a source of infectious diseases. We know for a fact that in 1528 many survivors of the Narváez expedition and Karankawa Indians who befriended the Spaniards died from “a sickness of the stomach.” This ailment manifested itself shortly after Narváez’s makeshift armada became shipwrecked along the Texas coast (Cabeza de Vaca 1944:1, 31). Although we cannot be certain of the particular disease(s) that was involved, dysentery or typhoid are logical candidates (Dobyns 1983:260-62). Both intestinal disorders can be retained for months or years after an initial attack (Cloudsley-Thompson 1976). One or both maladies, therefore, could have been spread by Cabeza de Vaca and his party as they crossed Texas and northwestern Mexico.

The accounts of subsequent expeditions led by Fray Marcos de Niza (1539) and Coronado (1540-41) make no mention, however, of diseases or significant disease induced changes that might be attributed to the
survivors of the Narváez expedition (Hammond and Rey 1940). Similarly, there is little or no evidence that De Niza's or Coronado's expeditions were responsible for the introduction of acute and chronic infectious diseases. Although shortly after Fray Marcos left Culiacán his Franciscan companion, Fray Onate, became ill from some unspecified malady; Fray Onate traveled only as far as Petatlán. There is no indication that other members of De Niza's small party subsequently became ill.

Coronado's expedition, which included several hundred Spaniards and over 1,000 Indians from New Spain and Nueva Galicia (Hammond and Rey 1940:7–8), logically would seem to have been a source of disease. Recently Upham (1986) suggested that the Tlaxcalan Indians, who accompanied Coronado and who remained in New Mexico after Coronado retreated, were a source of variola. Smallpox is not, however, a chronic infectious disease; had the Tlaxcalans weathered a bout with smallpox, they would have acquired an active immunity that freed them of the variola virus. It is more likely that the Tlaxcalans and other participants in the expedition harbored chronic infectious diseases such as dysentery, typhoid, malaria, and typhus. Again, however, the exploration chronicles and related documents make no mention of participants becoming sick, nor do they mention or allude to native peoples in the Greater Southwest becoming ill.

The Great Matlazahuatli of 1545–48

As noted in chapter 2, Nueva Galicia was rocked by a native uprising in the spring of 1541, while Coronado and many Spaniards from Nueva Galicia were exploring in the north. The rebellion, commonly known as the Mixtón War, began in the mountains near Mixtón among the Zacatecos, Caxcanes, Guachichiles, Nayaritos, and other “Chichimecs.” By the summer of 1541 the uprising spread to Culiacán, Compostela, Purificación, and Guadalajara. During the fall the rebels defeated a large Spanish and Indian force and laid siege to Guadalajara. Vicente Mendoza responded by assembling an army of 450 Spaniards and some 30,000 Tlaxcalan and Aztec warriors, who raised the siege. Over the next six months the Spaniards and their Indian allies killed or enslaved thousands of rebels, effectively restoring peace to much of Nueva Galicia (Bancroft 1886:490–514).

During the years following the Mixtón War the native population of New Spain and Nueva Galicia experienced what appear to have been minor outbreaks of disease, which reached epidemic proportions in 1545 (Beaumont 1932-11, 141; Grijalva 1924:213–15; Tello 1891:509–10, 524–27). The disease agents that were responsible for the “great matlazahuatli,” as it was called by Nahua speakers, are unclear. The Nahua term matlazahuatli apparently refers to a rash that was similar to, yet different from the smallpox or measles rash (Dobyns 1963:499–500). Two symptoms that frequently were used to characterize the epidemic were intense fever and nose bleeding (e.g., Gibson 1964:448–49; Mendieta 1945:174; Ocañana 1934:84). This combination of symptoms could reflect several diseases, although many researchers, following Zinsser (1934), believe typhus was the principal malady involved in the epidemic.

For centuries typhus was thought to be a single malady. It is now regarded as a group of related diseases caused by different species of *Rickettsia*, which are transmitted to humans by different arthropod vectors (e.g., lice, fleas, ticks). Epidemic or louse-borne typhus is caused by *Rickettsia prowazekii* and is transmitted by body and head lice. Long before Europeans came to America, typhus raged in Europe, frequently deciding the outcome of wars and altering the course of history (Cloudsley-Thompson 1976; Zinsser 1934). Despite its importance, typhus was not consistently distinguished from other diseases until the fifteenth century, when it became truly widespread in Europe (Cloudsley-Thompson 1976:106). One of the first recognizable outbreaks of typhus occurred during the battle of Granada in 1489. The disease reportedly was brought from Cyprus and in less than a year killed 17,000 Spanish soldiers—more than five times the number of Spaniards as died at the hands of the Saracens (Ashburn 1947:93; Cloudsley-Thompson 1976:107). Shortly thereafter, typhus came to be known as spotted fever (*tabardete, tabardillo*) and spread throughout the Iberian peninsula.

Given its widespread occurrence in Spain, typhus may very well have been carried to Mexico in 1545. That year the great matlazahuatli raged in New Spain for six months, claiming hundreds of thousands of lives (Bancroft 1886:529–30). The epidemic continued in various areas for several years, destroying what some believed was five sixths of the Indian population of New Spain (Grijalva 1924:214). What appears to have been typhus also raged for several years in western Mexico, in Jalisco and Nayarit (Bancroft 1886:552, 553; Beaumont 1932-II, 63). Unfortunately, like many early epidemics, it is unclear whether the epidemic spread up through Sinaloa to the villa of San Miguel and beyond (Figure 11). At the time, the villa of San Miguel was more or less an isolated outpost on the northern frontier (Mecham 1927:136). As early as 1536, the province of Chametla had been abandoned by Guzmán's
had but thirty Spanish householders who complained of being “at the end of the world.” La Marcha went on to note that rebellious natives in the vast territory north of Compostela imperiled communication between Compostela and the villa of San Miguel de Culiacán (Mecham 1927:54).

It would appear then that there was little northward movement of goods, people, and presumably disease agents from Compostela to the villa of San Miguel de Culiacán during the years when typhus raged in Mesoamerica. The chances or probabilities would seem to be greater that typhus and/or other diseases spread northward from central Mexico up the eastern slopes of the Sierra Madre Occidental. Between 1546 and 1548, during the height of the epidemic, several hundred Spaniards, and an even larger number of black slaves and natives from central Mexico, flocked to Zacatecas, where vast silver deposits were discovered (Bakewell 1971:15). Some of these mine workers may very well have harbored typhus, inasmuch as individuals who survive an initial bout with the disease frequently retain *rickettsia* for many years as a subclinical infection. These “healthy carriers” become a source of infection for others during times of stress or poor general health, when the body’s production of antibodies decreases, permitting a resurgence of *rickettsia* (Busvine 1976:53).

During the colonial period, disease was in fact quite common in the mining camps and towns of Durango and southern Chihuahua (West 1949:54), particularly what appears to have been typhus and respiratory infections such as pneumonia and influenza (Mota y Escobar 1940:148). Both maladies apparently flourished in the cool climate and the crowded and unsanitary living conditions that Indian, mestizo, and African mine workers often endured (Mecham 1927:220–21). Significantly, though we lack direct evidence that individuals harboring typhus traveled to Zacatecas between 1545 and 1548, the hospital of Santa Veracruz was constructed within a year of the founding of Zacatecas (Ocaranza 1954:126). Elsewhere, in Michoacán and Jalisco, for instance, the typhus epidemic of 1545–48 also prompted the construction of hospitals to care for the large number of Indians who became ill (Beaumont 1952:II, 141–45; Tello 1891:524–25; Cooper 1965:50–51).

**A Period of Relative Calm, 1548–76**

By 1550, the aboriginal population of central Mexico had been reduced by at least half (Borah and Cook 1963; Gibson 1964:138). Of those who survived, many had acquired an active immunity to diseases
such as smallpox and measles. Repeated exposure to various maladies may also have raised the frequency of heritable resistance factors in the native population as a whole (Cockburn 1963; Motulsky 1971:227). Accordingly, during the third quarter of the sixteenth century, central Mexico enjoyed what the documentary record suggests was an epidemiological period of relative calm (Cook and Simpson 1948:14; Mendieta 1945:174; Ocaranza 1934:85). Indeed, there is evidence that native populations in some areas of central Mexico actually may have rebounded somewhat during the third quarter of the sixteenth century (e.g., Kubler 1942, 1948; Spores 1967:75).

The epidemics that did occur during this period were not, however, without dire consequences, particularly when the diseases involved were uncommon. In 1550-51, for instance, some areas of New Spain and Nueva Galicia were devastated by an epidemic of what apparently was mumps (papax, bizaxones de garganta) (Beaumont 1952:III, 253; Gibson 1964:450; Tello 1891:54). A major epidemic of influenza also occurred in 1558-59 (Dobyns 1963:1983:269-70). More characteristic of the period, however, was the measles epidemic of 1562-64, which did relatively little damage as compared with earlier disease episodes (Bancroft 1886:553-41; Grijalva 1924:216; Ocaranza 1934:85). It is unclear, however, how far measles spread and whether it spread northward among virgin populations in areas such as Durango or northern Sinaloa, where it presumably would have exacted a heavy toll.

Unfortunately, there is a paucity of historical documents from the northern frontier that shed light on whether epidemics affected the region between 1550 and 1575. In his chronicle of the Ibarra expedition (1563-65), Obregón mentioned in passing that Ibarra's maestro de campo (Betanco) came down with measles in 1564, while Ibarra's expedition worked to construct a fort on the Rio Sinaloa (Hammond and Rey 1928:88-89). It is tempting to conclude that Obregón was confused or failed after twenty years to recall Betanco's illness, given that most Europeans in the sixteenth century contracted measles during childhood. It would seem to be more than a coincidence, however, that Obregón should specifically mention measles at a time when we know the disease had reached epidemic proportions in New Spain and Nueva Galicia. Inasmuch as measles is an acute infectious disease, Betanco could not have harbored rubella as a subclinical infection; he must have acquired the disease from another Spaniard or Indian.

Betanco's illness does in fact seem to be correlated with the arrival in Sinaloa of additional troops and supplies sent from Mexico by Ibarra's uncle. Also in the spring of 1564, Juan de Zaldívar traveled from Guadalajara to Sinaloa to deliver a royal cédula to Ibarra (Mecham 1927:141-43). Conceivably, any one of these sojourners could have harbored measles and infected Betanco. Whatever the case may be, it is significant that neither Obregón nor other members of Ibarra's expedition (see Mecham 1927) mentioned or alluded to measles or other diseases affecting native peoples in northern Sinaloa and southernmost Sonora. As we will see, this inference is borne out by later disease incidence and mortality patterns as well as native commentaries on Cahuiní exposure to disease.

THE SPANISH MINING FRONTIER AND THE FORGING OF THE ROUTES OF CONTAGION

While the Cahuiní and other groups in northwestern Mexico may have largely escaped the ravages of disease prior to 1575, several developments during the third quarter of the sixteenth century sealed the fate of native populations throughout the Greater Southwest. The most significant developments were the founding of numerous mines and related settlements along the eastern slopes of the Sierra Madre and the forging of an extensive transportation network that linked Spanish and Indian communities throughout central Mexico and northern New Spain (Figure 12). Because this network provided the principal routes of contagion during the late sixteenth and throughout the seventeenth centuries, the development and extent of Spanish trade and communication systems are sketched out in some detail below.

At the heart of the Spanish trade network was the camino real de la tierra adentro, the main road to the interior. This thoroughfare was opened from Mexico City to Zacatecas between 1546 and 1550, principally to service the many mines that were founded at this time in and about Zacatecas. Between 1550 and 1580, the road was extended farther to the north to service new mines that were opened near Sombrete, Durango, Topia, Indé, and Santa Bárbara. With the colonization of New Mexico, in 1598, the interior road again was extended farther northward, this time to Santa Fe, some 1,600 miles from Mexico City (Bakewell 1971; Moorhead 1958; Powell 1952; Scholes 1930; West 1949). From its inception, the camino real of the interior witnessed a regular flow of goods and people. Initially, most commodities and laborers, including Spaniards, African slaves, and free Indians, traveled from Mexico City to Zacatecas in packtrains and small convoys of two-wheeled carts. To better serve the mining community and increase exports of bullion, the interior road was widened and otherwise improved. By 1555, wagons
that carried upwards of 4,000 pounds were traveling to and from Zacatecas in groups of twenty to forty, together with muleteers and individuals on horseback or foot (Bakewell 1971:20-21). Caravans bound for the northern frontier assembled in Mexico City during each month of the dry season, from October through July (West 1949:86, 89, 130-61). Travel conditions were optimal during the winter and spring, and it was possible for a caravan from Mexico City to reach Zacatecas in approximately four weeks. Caravans that continued northward reached Santa Bárbara in another four to eight weeks, while those bound for New Mexico took approximately nine months to complete the entire trip from Mexico City to Santa Fe.²

During the colonial period there was another road, albeit secondary, that facilitated the movement of people, goods, and disease agents from southern Mexico into the Greater Southwest. This mule trail came to be known as the camino real of the coast and was used by Nuño de Guzmán and later explorers. Rather than forging a new road, the early conquistadors actually followed a series of overlapping native trails that began in Guadalajara and extended down the western escarpment of the Mesa Central to Compostela. From there the coast road continued up through lowland Nayarit and Sinaloa to San Miguel de Cuilacán. After circa 1565, a series of native trails were incorporated into the coast road that led from San Miguel northward along the foothills of northern Sinaloa and Sonora, and eventually into southern Arizona (Burris 1965:map 43; Sauer 1932; West and Augelli 1966:299-302; West 1949:30).

As we have seen, during the decades immediately following the founding of Nueva Galicia, the coast road was used primarily to herd slaves southward to Guadalajara and Mexico City (Paso y Troncoso 1939:IV, 183, VI, 40; Zavala 1957:203-4). After Ibarra pacified and resettled Chametla in 1565, the small Spanish and mestizo population of Nayarit and Sinaloa began exporting salt to the burgeoning mining frontier on the eastern slopes of the Sierras as well as to New Spain. In 1603, Governor Urdiñola reported that the inhabitants of Chametla alone sent 6,000 to 20,000 fangeag (15,000 to 51,000 bushels) of salt each year to a dozen or so mining centers on both sides of the Sierras (Navarro García 1967:30). Spaniards at Chametla, San Miguel, and other points along the coast used native labor and technology to harvest tons of shrimp, oysters, and fish for export. By the turn of the seventeenth century the residents of Chametla reportedly were supplying a large percentage of

²The travel times given here are estimates. According to Captain Díaz y Díaz (1869), the travel distance from Mexico City to Zacatecas was 143.4 leagues (600 kilometers). Since many wagon trains apparently traveled five or six leagues a day along the interior road (e.g., Moench 1958:27, 116), it should have taken about a month for caravans from Mexico City to have reached Zacatecas. According to West (1949:88), the dry season trip from Mexico City to Santa Bárbara took three to four months (West 1949:88). Caravans bringing supplies to New Mexico took approximately nine months to complete the entire trip from Mexico City to Santa Fe (Schles 1930:86-87). Apparently it took one month to go from Mexico City to Zacatecas, and another seven or eight months to go from Zacatecas to New Mexico.
the prepared fish consumed in not only Nueva Galicia, but also Nueva Vizcaya and New Spain (Mota y Escobar 1940:87–88). Salt and fish were exported along with lard, beeswax, raw cane sugar, bananas, oranges, and other tropical and semitropical fruits.

Although large amounts of fish, salt, and other products from Nayarit and Sinaloa reached the mining frontier via Guadalajara and Zacatecas, an equally large, if not greater share of goods was transported over the Sierra via what came to be known as the Topia Road. This mule trail stretched for some seventy miles from the village of Tepehuanes, on the eastern slopes of the Sierras and a short distance from the camino real of the interior, on up to the real de Topia. From Topia the road continued down the western slopes of the Sierra to the villa of San Miguel.

The Topia Road, or that portion of it which extended from Tepehuanes to the real de Topia, was frequented as early as the 1570s by muleteers who brought equipment, reagents, foodstuffs, and other necessities to miners working at the real of Topia, and who returned to Durango with silver ore. By 1603 the real of Topia had ten merchants who were supplying local as well as distant miners working in the reales of San Andrés, San Hipólito, Las Virgenes, and Sianori (Mecham 1969; Mota y Escobar 1940; West and Parsons 1941:410–11). During the closing decades of the sixteenth century, Topia became a resting place for muleteers who hauled wheat, chile, cloth, mercury, and other products down the western escarpment of the Great Divide to San Miguel and other settlements along the Pacific coast. The muleteers hauled salt, fish, fruit, silver, and other items back to Topia and on over the Sierras to the mining frontier. During the dry season muleteers reportedly completed the entire 140-mile journey from San Miguel de Culiaco to Tepehuanes in less than two weeks (West 1949:77, 79, 90; West and Parsons 1941).

In summary, then, Spanish mining activity along the eastern slopes of the Sierras led to the development of an extensive transportation network during the second half of the sixteenth and early seventeenth centuries. At the heart of this network were the coast and interior roads that linked central Mexico with the Greater Southwest and several mule trails, the most important of which was the Topia Road, which linked both the eastern and western slopes of the Sierra Madre. Significantly, all three roads or trails were frequented primarily during the winter or dry season (Mota y Escobar 1940:99–100; Paso y Troncoso 1939:14, 183; West 1949:86, 89). This is precisely when acute infectious diseases such as smallpox, influenza, and measles have their highest incidence. This is also when epidemics characterized by smallpox, measles, typhus, and malaria were more common. In fact, there are many instances of people travelling from Mexico City to Zacatecas or Guadalajara, those who left the capital had only to transmit infections to one or two other susceptible individuals to ensure the arrival of disease agents in Nueva Vizcaya and Nueva Galicia.

Spaniards, Indians, and slaves were not, however, the only disease vectors. Textiles, particularly cotton, also can harbor smallpox. Moreover, there is some evidence that the measles and influenza viruses can be transmitted in textiles (May 1958). Importantly, cloth was the principal medium of exchange in northern New Spain during the colonial period (Bolton 1948:80; West 1949:81). In an early letter from the mission of Parras, Father Arraya noted that some Zacateco Indians traveled sixty and eighty leagues, between 150 and 250 miles, to work for Spaniards and to obtain clothing (DHM 1601:67–68). Many Spaniards used payment in cloth to attract Indians to work in the mines of Durango and Chihuahua (West 1949:81). Accordingly, textiles were the largest item by quantity imported by merchants in Zacatecas and lesser settlements in Nueva Vizcaya (West 1949:82). Cotton, wool, and cloth of varying quality and manufacture also were imported in large quantities by the Jesuits (Polzer 1972:234–39) and the Franciscans (Scholes 1930:100, 187).

It is likely, therefore, that some epidemics originated with textiles as opposed to people. Whatever the disease vector, once smallpox, malaria, and other maladies reached Zacatecas or Guadalajara, opportunities abounded for the further spread of disease. This is true with respect to both insect- and noninsect-borne diseases. In this regard, the historical record from northern Mexico is replete with references to lice and what appear to be anopheline mosquitoes, the only known disease vectors.

As late as the 1920s, the most common transaction between Mexican muleteers and Tarahumara Indians was the barter of surplus corn for cotton cloth (Benitez and Zunig 1935:177–83).

Although it is difficult to demonstrate that the mosquitoes mentioned by early observers were of the anopheline variety, the Jesuit missionary Ignat Pfeiffer noted that the mos-
vectors for typhus and malaria, respectively (e.g., Alegre 1958:77; Arregui 1946:46; Carrera Stampa 1953:125, 175; Cuidad Real 1976:122, DHM 1598:60; Mora y Escobar 1940:85–86; Nentvig 1980:33; Treutlein 1949:137–38).

The Epidemic of 1576–81

The transportation network that took shape during the decades following the discovery of silver at Zacatecas brought disease agents that were endemic or semendemic in the south in contact with populations in the north that had little or no prior exposure to maladies like smallpox. Viruses and other microorganisms undergo significant genetic changes when exposed to a new host environment, changes often resulting in new and more virulent strains of microorganisms (cf., Aschmann 1959:188; Beveridge 1978:50–51; Moruly 1971:247). Such changes may have occurred during the third quarter of the sixteenth century, resulting in new forms of smallpox, measles, and other diseases. For whatever reasons, in 1576, the decades of relative calm that New Spain had previously enjoyed came to an abrupt end (Figure 13).

During the spring of 1576 and for four or five years thereafter, Mexico was ravaged by what may have been the plague and/or typhus, typhoid, and dysentery (Dobyns 1983; García-Ábáso 1983:67ff.). The epidemic reportedly was the same as that in 1544 and 1555 (Bancroft 1886:628n45), characterized by a dynamic fever and nose bleeding (Gibson 1964:449; Grijalva 1924:216; Mendiesta 1945:174; Ocaranza 1934:85). Other symptoms mentioned were intense headache and violent stomach pains (Bancroft 1886:657–58; Florentia 1955:257). These symptoms, when taken as a whole, are highly suggestive of typhus, typhoid, and dysentery. Historically, all three diseases have tended to work in concert (Cloudsley-Thompson 1976; Zinser 1934:256).

Although Spaniards, mestizos, and other “mixed bloods” suffered during the epidemic, it was the non-European population that apparently suffered most. In a letter to the king, dated February 25, 1577, the prioros of the Convent of Santo Domingo in Mexico City noted that almost 600,000 Indians had died during the preceding eight or nine months, along with many religious (Cuevas 1926:II, 500–501).

Equities in Sonora were particularly unbearable at night, when they invaded houses (Treutlein 1949:138). This behavior is characteristic of Amblyomma maculatum ferox, the principal malaria vector in northern Mexico today (Ross and Roberts 1943; Russell et al. 1943:22). Amblyomma maculatum ferox also is found today in the American Southwest, together with Amblyomma americanum levi (Ross and Roberts 1943). Amblyomma americanum is the principal malaria vector along the Pacific lowlands, where in modern times it has been responsible for a very high mortality rate from malaria (Ruiz 1949:756–57).

Figure 13. Typhus epidemic of 1576–81.

Other sources also indicate or suggest that the highest case frequency and mortality occurred among Indians and to a lesser extent blacks (Aguirre Beltrán 1990:194; Cooper 1965:49; Gibson 1964:449). The Jesuit historian Florentia (1955:257) reported that the census books from New Spain showed that more than two million Indians died during the first year of the epidemic. Another Jesuit, and an eyewitness, Juan Sanchez, estimated that the epidemic killed two thirds of the native
population of New Spain (Alegre 1956:184–85).

Among the millions who perished were untold thousands in Nueva Galicia. The "great sickness" appeared in Jalisco and Nayarit in the spring or summer of 1577 (Mota Padilla 1924:311; Tello 1891:623). In 1578, when many mining areas reported declines in silver production, coincident with typhus and the deaths of black and Indian mine workers, the mines of Chiamela had increased production; there was no mention of typhus in Chiamela or points farther north (García-Abásolo 1983:127). The apparent failure of typhus to spread northward from Nayarit is surprising given the regular movement of goods, people, and presumably disease agents up the coast road from Guadalajara. In 1581 there were eight or ten Spanish households in Compostela, twenty in Chiamela, fifty in San Miguel de Culiacán, and sixty in the village of Cinaloa on the Río Fuerte (Paso y Troncoso 1939:52).

Disease agents, which may not have spread up the west coast of Mexico, could nevertheless have spread to northern Sinaloa from Durango via the Topía Road. Not long after typhus appeared in Mesoamerica, the great *maliáxahuitl* spread northward into Zacatecas. Although one Spanish official in 1576 lamented the fact that the hostile Chichimec had not been affected by the epidemic (Naylor and Polzer 1986:52), by 1584 infectious diseases had all but destroyed the Indian population of the Cazcan country (Powell 1952:168). The great *maliáxahuitl* likewise wreaked havoc in Zacatecas. The *fiscal* of Guadalajara reported that the disease killed more than 2,000 Indian mine workers in Zacatecas in 1576–77 (Bakewell 1971:126–27).

Typhus, typhoid, and dysentery apparently next spread northward into Durango and southern Chihuahua (García-Abásolo 1983:126). It should be noted that between 1533 and 1578 the Franciscans baptized thousands of natives and established permanent missions in Nombre de Dios, Durango, Topía, the San Bartolomé Valley, and Peñol Blanco (Arlegui 1851; López-Velarde 1964; Mechem 1927). Many of these converts apparently died during the typhus epidemic that began in 1576, as is suggested by a petition from officials in Durango that was sent to the king in 1579. The petition requested permission to import 1,000 Tlacalan and other Indians to increase the supply of Indian mine workers in Nueva Vizcaya (Mechem 1927:231). Requests of this nature or for new *encomiendas* often were correlated with disease-induced reductions in population (e.g., Bakewell 1971:200; Friede 1957:339; Griffen 1979:100). Not long after the epidemic, Spaniards from the Santa Bárbara region also began slave raiding as far north as the La Junta area, apparently to offset the loss of Tepehuán laborers (Griffen 1979:2).

Disease Episodes During the Closing Decades of the Sixteenth Century

During the closing decades of the sixteenth century, a medley of contagious diseases assaulted the native peoples of New Spain. The epidemic of 1575–81 was followed in 1587–88 by a *cocoliztli* that killed many Indians in southern Mexico and Nueva Galicia (Bancroft 1886:754–55; Gibson 1964:449; Mendieta 1943:174; Tello 1891:692, 694). Again in 1590, and for several years thereafter, New Spain and Nueva Galicia were beset with smallpox, measles, *cocoliztli*, and other unidentified diseases (Alegre 1956:367, 371; Gibson 1964:449; Mota Padilla 1924:316; Shes 1934:142; Simpson 1938:51; Tello 1891:699). It should be noted that the Nahua term *cocoliztli*, which frequently was used in a general sense meaning epidemic or great sickness (Gibson 1964:448), also may have been used frequently, albeit unknowingly, to refer to fulminating smallpox (Flors 1886:112; Oceana 1934:36). This clinical form of smallpox is characterized by death within four or five days of acute *viraemia* and often within forty-eight hours, before a rash or other diagnostic symptoms appear. Malignant smallpox, with the characteristic smallpox rash, pertains to patients who survive the initial onslaught of acute *viraemia* and who live for another ten to fourteen days, during which time *parotida* invades the dermis and epidermis as well as destroys other tissues, resulting in death from general toxemia. The fact that *cocoliztli* and *viruela* (smallpox) frequently were mentioned together (e.g., Hackett 1957:108) is perhaps a reflection of this modern clinical distinction.

As with many pre-Jesuit disease episodes, it is difficult to determine what impact these latest epidemics had on native peoples in northwestern New Spain. We know, however, that the Zacatecas, Tepehuán, Acaze, and Xixim all had considerable contact with Spaniards. As noted, the Franciscans established missions in Nombre de Dios, Durango, Topía, the San Bartolomé Valley, and Peñol Blanco as early as the 1560s (Arlegui 1851; López-Velarde 1964; Mechem 1927). In 1578, five additional missions were established by 1590 at Mapimi, San Juan del Mesquite, San Francisco del Mesquite, Cuencame, and Saltillo. Many Zacatecos, Tepehuán, Acaze, and Xixim also worked on Spanish farms and ranches and in Spanish mines and households (e.g., Alegre 1956:422–24; DHM 1601:67–68; Pérez de Ribas 1944:III, 250–53). By 1571 there were close to 300 Spaniards residing in Durango, and there were another thirty or so Spanish haciendas in its environs. In 1575 the most northerly Spanish settlement of Santa Bárbara had thirty Spanish households and was
surrounded by numerous Spanish farms. During the 1570s both Spanish farmers and missionaries appropriated land along the upper Río Florida from the Tepehuan. Some of this land was worked by Tlaxcalan and other “civilized” Indians from the south, over 1,000 of whom were imported to work the mines and on Spanish haciendas in Durango and southern Chihuahua (Mecham 1927:230–32). By 1581 there also were one or two farms in the Valley of San Gregorio, and by 1591 there were a number of small irrigated farms near Todo Santos (Griffen 1979:1:44; West 1949:1–11).

The extent of native contact with Spanish miners is reflected in several letters describing the first Jesuit contacts with the Tepehuan, Zacatecos, and Iriritilla. In a letter written in August 1594, Father Gerónimo Ramírez described the first Jesuit entrada among the Zacatecos. Ramírez noted that he was greeted at Cuencamé by many natives who owned horses and were well dressed, some of whom worked in nearby mines. Ramírez also noted that during his stay in Cuencamé he was lodged in an adobe house that belonged to a Tlaxcalan Indian from Michoacán (Alegre 1956:422; Pérez de Ribas 1944:III, 250). Similarly, Ramírez’s companion, Father Juan Augustín de Espinosa, noted that, while he was visiting a Zacateco pueblo along the Río Naxas, a Spaniard came to the pueblo looking for several Indians who owed him money or labor (Alegre 1956:423–24; Pérez de Ribas 1944:III, 251–53). Father Nicolás de Atayna (DHM 1601) noted that when he began working among the Iriritilla of Parras he found there were many men and women who worked voluntarily or were pressed into service as servants in the houses of Spaniards. Atayna noted that there was one pueblo along the Río Naxas where the residents were particularly well dressed and had dealings with Spaniards for many years (AGN 1601:67–68).

It is hard to believe this contact with Spaniards was not coincident with exposure to smallpox, measles, typhus, and other maladies that were carried north along the camino real of the interior. During the 1580s Spaniards in Nueva Vizcaya increasingly complained that they were starving because there were no Indians to work for them (Mecham 1927:207). More telling are Jesuit reports of a variety of behaviors and beliefs regarding disease that were current among the Zacatecos, Iriritilla, and various serrano groups at the time of Jesuit contact. The Jesuits, for instance, reported that there were many Axace, Tepehuan, and Laguneros who abandoned their sick and, in some instances, burned them alive, for fear of becoming ill and dying (DHM 1596:50; DHM 1598:57).

The priests also were shocked and dismayed by the widespread practice of child sacrifice to ward off disease or to insure the recovery of adults who became ill (DHM 1598:51; Pérez de Ribas 1944:III, 148–49). The annual reports from the 1590s also contain numerous allusions regarding Axace and Tepehuan idols to which offerings were made to ward off disease and death (Alegre 1958:83, 93; DHM 1601:65, 71–74; Pérez de Ribas 1944:III, 13–22). One source even notes that the Axace had an idol and deity of what appears to be “bloody stools” (DHM 1601:65), a prominent symptom of maladies like dysentery. Interestingly, Father Juan Augustín de Espinosa was told that “two very horrible negroes” had traveled through the Laguna region telling the natives that baptism brought the great sickness and death. Espinosa further noted that the Zacateco talked of how “the devil appeared like a dreadful and terrible negro, drenched in blood that flowed from his mouth and ears, with fire shooting from his eyes.” Reportedly, the black man terrified the people, threatening them with death and commanding them to perform rituals involving child sacrifice (DHM 1598:48; Pérez de Ribas 1944:III, 248).

A letter written in 1604 by Father Francisco de Arista from Parras suggests that native fears of the devil were warranted. In his letter, Arista related how the priests working among the Laguneros of Parras had happened upon a cave, apparently what came to be known as the Cave of Texacalco, where the priests found a mass burial that was also something of a shrine. The Laguneros told the priests that the mass grave contained the bodies of those who were killed by the devil, and that the devil appeared at times in the form of a serpent, or in human form, although fierce and horrible looking. On one occasion the devil came to the natives in the habit and cleric’s dress that was worn by the Jesuits (Pérez de Ribas 1944:III, 263–64).

Native fears of baptism, the use of idols specifically charged with controlling disease, and mass graves may all have been consequences of epidemics that affected the Laguneros, Tepehuan, and Axace prior to Jesuit contact. Lagunero stories about the devil appearing in a cleric’s habit and punishing the natives with disease may refer specifically to typhus that was spread by Franciscan missionaries who established a short-lived mission in the Valley of Parras in 1578, at the time of the epidemic of 1575–81 (Dunne 1944:203n20). Native stories about blacks

*Alegre (1958:100) has a slightly different version of Arista’s letter, wherein the burial was described as consisting of: “many graves, filled with skulls and human bones, which the Indians had covered with many stones; so that their dead might not be seen. The rocks that formed this monument [covering the graves] were marked with letters or characters, in blood, in places so high that only the devil could have formed them. [The letters or characters were so] well formed and placed that after many years neither rain nor wind had erased or diminished them.”
wandering about the Laguna region with blood flowing from their ears and mouths and punishing people with disease may refer to slaves or mulatto mine workers who fled Mapimi and Parras during the typhus epidemic of 1575–81. Bleeding (sujumento de sangre) was a symptom frequently used to describe the epidemic (Gibson 1964:449; Mendel 1945:374). We also know that during the latter half of the sixteenth century there were many mulattos and mestizos who worked as free laborers, drifting in and out of the mining camps and reales of northern New Spain (West 1949:48–49). In 1570 there reportedly were 2,375 black slaves in Nueva Galicia, 500 of whom were working in and around Zacatecas (Aguirre Beltrán 1940:209–11).

During the period from 1575 to 1591, northern Nayarit and southern Sinaloa also may have been affected by typhus and other maladies. Tello (1891:623, 692–94) and other historians alluded to disease episodes in Nueva Galicia during this period that contributed to a 90 percent reduction in the aboriginal population (Bancroft 1886:552–53). Sometime prior to 1564 the villa of San Miguel was relocated from the Río San Lorenzo to the Río Guilaín (Gerhard 1982:261), presumably because the Tahue population had declined to the point where it could no longer fulfill encomienda requirements. In circa 1604, Bishop Mota y Escobar toured Nueva Galicia, noting that the once populous province of Guilaín had become an unhealthy place with a fraction of its aboriginal population (Mota y Escobar 1940:105ff.).

There are several lines of evidence that suggest that the northward spread of disease in Sinaloa was restricted to the Tahue population prior to 1593 (Figure 14). Specifically, during the epidemic of 1593, which is examined in detail below, apparently all age groups among the Căhita and Guasave suffered equally from smallpox and measles. This is precisely what you would expect of “virgin soil populations” exposed to measles and smallpox for the first time. Also in one of two letters in the anua of 1593 (AGN 1593; Dunne 1940:32; Alegre 1956:393), Father Velasco noted that the natives complained that it was only after the Jesuits came to San Felipe that the Indians suffered from disease; the Căhita claimed that they previously enjoyed good health.

It is of course possible that the Jesuits were misled about the Căhita's lack of exposure to disease. One can readily imagine native priests or bechiceros—the Jesuits' arch-rivals—claiming that the Căhita never had suffered from disease. It is also possible that the Căhita and Guasave were affected by smallpox and measles at a very early date, say during the 1530s, and were not exposed to these diseases again until 1593. A disease history of this sort could have resulted in the high case frequency and mortality for all age groups that was reported during the epidemic of 1593, and which ordinarily characterizes virgin soil epidemics.

The above possibilities must be weighed against the fact that early Jesuit accounts of the Căhita and Guasave speak of large, healthy, well-functioning populations (e.g., AGN 1592). These accounts lend further support to the idea that the Căhita, Guasave, and populations farther
to the north did, in fact, escape the ravages of disease prior to 1593. Such good fortune may have resulted from a no-man's-land that was created prior to 1564, which separated the Tahue from their northern neighbors and which presumably blocked or hindered the northward spread of disease. According to Obregón (Hammond and Rey 1928:77), the region immediately to the north of the Rio Mocorito, for some eighty kilometers, largely was abandoned by 1564, presumably as a result of slave raids and native efforts to distance themselves from raiding parties originating from San Miguel de Culinacán (see also Pérez de Ribas 1944:1, 157).

Avoidance and open hostility toward Spaniards may also help explain why the Cáhto and Guasave escaped the ravages of disease prior to 1593. In 1564 and 1563, Spanish settlements were attempted along the Rio Fuerte that were promptly destroyed by the Suaqui. In 1584, a handful of Spaniards who survived the destruction of San Felipe y Santiago de Carapea on the Rio Fuerte retreated to the Cinaloa River, where they established the villa of San Felipe. During the years leading up to the arrival of the Jesuits in 1591, the five Spaniards had very little contact with other Spaniards living at San Miguel, who could have been a source of disease agents (Alegre 1936:346-64; Dunne 1940; HHB 1633; Pérez de Ribas 1944:1, 145-62; Shiel 1934).

POST-JESUIT EPIDEMICS IN NORTHWESTERN NEW SPAIN

The Epidemic of 1593 in Sinaloa

The epidemic of 1593 occurred two years after Fathers Gonzalo de Tapia and Martín Pérez established the first permanent Jesuit mission in northwestern New Spain. The two priests arrived at San Felipe in July 1591, and promptly distinguished themselves from the handful of Spanish encomenderos at the villa by learning Cáhto and by not appropriating Indian food and labor. Native interest in the Black Robes soon was aroused and thirteen crude churches were erected in as many villages along the Mocorito, Sinaloa, and Ocotoni Rivers. It was impossible, however, for two priests to attend to the doctrinal needs of so many missions. The need for more priests became apparent when Father Tapia suffered a relapse of what seems to have been malaria, which he apparently contracted several years earlier in Pátzcuaro (HHB 1633; Shiel 1934:126-27). Tapia was persuaded by Father Pérez that a change in climate might facilitate recovery. As luck would have it, Spanish and Tarascan miners in the real of Topia previously had written Tapia to ask that he visit them. Accordingly, in March 1592, Tapia left for the Sierras and the real of Topia. About this same time, two priests arrived at San Felipe to assist Pérez.7

Tapia remained at Topia for six or seven months, attending to the spiritual needs of Spanish and Indian miners and also organizing a Christian pueblo (Santa Cruz del Valle) among the Aaxae. Meanwhile, Father Pérez and his two new assistants, Fathers Santiago and Velasco, continued the difficult task of instructing and preparing Cáhto adults for baptism. A permanent mission also was begun near the coast, among the Guasave. After Tapia returned to San Felipe around Christmas, 1592, Velasco was formally assigned to the Rio Mocorito and the pueblos of Bacubiritó and Orabatú in the foothills above the River Sinaloa. Santiago was in turn placed in charge of the mission of Lopochu with its visitas along the upper Ocotoni and River Sinaloa. Father Pérez continued his work at Cubiri and Bamaoa (a Painan-speaking pueblo inhabited by Nébomeños who were descendants of those who accompanied Cabza de Vaca in 1536), while Tapia, acting as local superior, visited all the missions.

It was apparently in January of 1593, when all seemed to be going so well, that the Jesuit missions in Sinaloa were ravaged by smallpox and measles (Figure 15). The epidemic followed a visit Father Tapia made to Mexico City late in 1592. Under the terms of the Patronato Real, the Jesuits and other missionary orders had to have permission from the Viceroy to establish new missions, which were subsidized by the Crown (see Polzer 1976; Shiel 1934:172-179; Treutlein 1939). Tapia, who was local superior in Sinaloa, was anxious to expand the Jesuits' work among the Cáhto, and, accordingly, traveled to Mexico to petition the Viceroy and the Jesuit Provincial for more funds and priests for Sinaloa. To demonstrate the worthiness of his request, Tapia brought a small group of young converts with him. On the way back to Sinaloa, all but one of Tapia's neophytes died at Valladolid (Morelia), during an epidemic of smallpox (HHB 1633:66-71; Shiel 1934:140). After the tragedy, Tapia continued on to Sinaloa with a new recruit, Brother Francisco de Castro, apparently arriving at San Felipe before Christmas. Shortly thereafter,8

7 Although Dunne (1940:30) stated that Velasco and Santiago came to San Felipe in 1593, the annua of 1593 (AGN 1593) indicates that the two priests arrived in March 1592.

8 The annua of 1593, which was compiled in Mexico in March of that year, provides a detailed account of the epidemic and implies it began after Christmas of 1592 (AGN 1593). The annua as well as a letter from Tapia (Shiel 1934:142) indicates the priest was present in Sinaloa at the time of the epidemic.
smallpox and measles appeared, suggesting that both maladies accompanied Tapia’s party from Valladolid.

Whatever their origins, smallpox and measles spread rapidly to many mission settlements as well as to gentile pueblos forty miles from San Felipe. Reportedly, almost everyone came down with measles or smallpox, leaving many communities unable to care for the sick and dead. Pérez de Ribas noted both maladies were so unusually contagious and lethal that there were “mountains of dead” (Pérez de Ribas 1944:1, 172). Father Martín Pérez (AGN n.d.:346) offered a particularly graphic account of the epidemic, noting that smallpox and measles spread from village to village, afflicting almost everyone and leaving many houses filled with people burning with fever and covered from head to foot with repulsive crusts.

The Jesuits responded to the disaster by turning their residence at Cubiri into a hospital. Those who were able to reach the hospital were fed and cared for by Brother Castro, who also assumed some of the regular duties of a priest, baptizing the sick and administering the last rites. Fathers Tapia, Pérez, Velasco, and Santiago meanwhile made the rounds of the missions, working day and night, attending to both the corporal and spiritual needs of their neophytes. It was impossible, however, for the Jesuits to attend to all the sick and dying, particularly as many natives fled their villages in fear and horror. Reportedly, many who fled were later found lying under trees in the monte or scrubland of the coastal plain. So great were the losses that many bodies were left where they lay for want of someone to bury them. Ironically, the priests and, more precisely, their native assistants, may have unknowingly helped spread disease. Father Velasco wrote of one occasion when Father Tapia visited a pueblo that had escaped the epidemic, but where many subsequently became ill and died (AGN n.d.; AGN 1593; 1594; Pérez de Ribas 1944:1, 172–73; Nieremberg 1889; Alegre 1956:391–94; Shiels 1934; Dunne 1940).

By the Jesuits’ own admission, there were many natives who died during the epidemic without ever seeing a priest (Alegre 1956:392; AGN 1594:36). It is difficult, therefore, to know how many natives suffered and died during the epidemic of 1593. Reports that entire households became ill and that “almost everyone” suffered (AGN n.d.:346) suggest that at least half and perhaps three-quarters of the mission population of Sinaloa contracted smallpox or measles. Similarly, accounts of accumulating bodies forming mountains (Pérez de Ribas 1944:1, 172) or of bodies left where they lay for want of someone to bury them (AGN 1594:36) are suggestive of a high mortality rate. In a letter to a fellow Jesuit, Father Tapia noted that two thirds of the children whom he had baptized had died during the epidemic (Shiels 1934:142–43). Other priests also lamented the large number of infants and children as well as adults who perished (e.g., AGN 1594b:55–56; Alegre 1956:392).
At the time of the epidemic, there were approximately 6,000 baptized Indians living in twenty-four mission communities (AGN 1594:33). The majority of these converts apparently were under the age of thirty and probably half were infants and children under the age of thirteen (Alegre 1956:392). A case frequency rate of 75 percent and a mortality rate of 50 percent would indicate 4,000 natives became ill and 2,000 died. These figures must be seen as conservative and do not include many adult Cahita who had not been baptized at the time of the epidemic.

While the epidemic of 1593 was by many accounts widespread (e.g., Shiels 1934:142), its precise areal extent is unclear. The various accounts mention great suffering along the lower and middle Río Sinaloa and along the río Ocoroni. Indirect evidence suggests that the epidemic spread to the foothills above the Río Sinaloa, where the Jesuits had established a mission in the foothills among the Bacuburito and also had made contact with the Comanitos and Cahuemotos. The Bacuburito, who spoke a dialect of Tahue and had close ties to the inhabitants of the Río Culiacán, resided in five pueblos, including Bacuburito itself, with some 700 Christians. Many of these Christians apparently were baptized by Franciscan missionaries who worked briefly at the villa of San Miguel years before the Jesuits came to San Felipe (AGN 1594:34–36). Perhaps as a result of Spanish mistreatment and exposure to disease, the Bacuburito fled the Río Culiacán to the foothills above the Río Sinaloa, where the Jesuits found them in 1591.

Because of the great suffering in and around San Felipe, the Jesuits were unable to visit the foothills during the winter of 1593. Just after the epidemic subsided along the coast, in 1594, Father Martín Pérez finally visited the Bacuburito and reportedly was besieged with requests to celebrate a mass for the dead. Large numbers of mourners gathered for the two-day feast, bringing tamales, cotton, honey, and other offerings that were redistributed in honor of the many who apparently had died during the previous six months, presumably from smallpox and measles (AGN 1594:34–36).

During the epidemic of 1593, Father Velasco, who resided along the Mocorito, left his mission to help care for hundreds of Guasave who became ill and who perished along the lower Río Sinaloa (AGN 1594:36; Pérez de Ribas 1944:1, 173). Velasco's absence from his paródo or mission district would seem to suggest that smallpox and measles did not have a serious impact on the Tahue of the Río Mocorito. The three mission pueblos of the Río Mocorito, which had a population of less than 1,000 (AGN 1595:56–57), were inhabited by Tahue speakers who undoubtedly suffered during several earlier epidemics that are known to have affected their kin along the Río Culiacán. It should be noted that the Jesuits made no mention of the epidemic of 1593 having spread to the Río Culiacán, even though natives from there frequently visited the Jesuits at San Felipe (e.g., AGN 1594:34). Perhaps the Tahue were affected in 1587 and 1588 by smallpox and measles, when New Spain and Nueva Galicia suffered from el coqueluz (Bancroft 1886:754–55; Gibson 1964:449; Mendicuti 1945:174; Tello 1891:692, 694). As discussed below, the inhabitants of the Río Culiacán did suffer from smallpox, measles, and one or two other maladies in 1602. At this time there may have been a sufficiently large number of children and adolescents who had never been exposed to variola and ruéola, providing the critical mass needed to sustain an epidemic.

It is unclear how far north the epidemic of 1593 spread and, in particular, whether it affected the Suaqui and other Cahita speakers along the Río Fuerte. Shortly after the Jesuits arrived in Sinaloa, Father Tapia visited the Suaqui, principally to explain the Jesuits' intentions. As previously noted, the Suaqui had successfully resisted previous attempts by Ibarra and other Spaniards to establish a settlement along the Río Fuerte. About the time the epidemic of 1593 subsided (Alegre 1956:394), Sinaloa was rocked by an earthquake that caused great concern among the Suaqui and their Cinaloa neighbors, with whom they were allied through kinship. Elements of both tribes became convinced that Tapia had caused the earthquake because of his displeasure over the natives' reluctance to accept Christianity. In a show of respect and fear, delegations from both tribes visited Tapia, bringing gifts and requesting that Tapia visit their lands to baptize their children. Tapia acceded to the natives' request and reportedly found many Suaqui and Cinaloa were frightened, presumably from the epidemic and earthquake. It is not clear, however, that he found them suffering from smallpox or measles. During his visit, Tapia reportedly baptized some 600 children; there is no indication that he also baptized adults who were in danger of dying (Alegre 1956:394; AGN n.d.:348; Pérez de Ribas 1944:1, 173–74).

It is important to note that when the Jesuits entered a gentle area for the first time they were bound by strict rules governing baptism (Polzer 1972, 1976). The priests were allowed to baptize infants and children with the parents' consent and with the assurance that the children would learn Christian doctrine, and would thus come to understand and appreciate their initiation into the Catholic Church. Adults were baptized only after they had received sufficient instruction and understood the basic tenets of Christianity. There was one exception to
this rule: priests were allowed to baptize consenting adults who were in danger of dying. In point of fact, the Jesuits regularly baptized gentle adults who were suffering from Old World diseases. The fact, therefore, that Tapia did not baptize adults suggests that either the Suaqui and Cinaloa escaped the ravages of disease or the epidemic spread to the Río Fuerte early in 1593, exacting its toll before Tapia's visit. Given what we know about the epidemic, particularly its virulence and persistence for many weeks, the latter possibility seems more likely. As discussed in the following chapter, demographic trends support the idea that the Cáhita of the Río Fuerte were affected by the epidemic of 1593.

The Epidemic of 1594 in Durango

In speculating about the origins of the epidemic in Sinaloa, it was suggested that smallpox and measles may have been carried northward from Valladolid, where smallpox killed a number of young converts who had accompanied Father Tapia to Mexico. Valladolid was one of many areas in southern Mexico that experienced epidemics of smallpox, measles, and other maladies between 1590 and 1593 (Alegre 1956:367-371; Gibson 1964:449; Mota Padilla 1924:316; Simpson 1938:51; Tello 1891:699). Because disease was widespread at this time in central Mexico, there undoubtedly were numerous occasions when sarcoa and other microorganisms accompanied muleteers, miners, and missionaries who traveled northward along the coast and interior roads. It is not surprising, therefore, that less than a year after smallpox and measles appeared in Sinaloa, the Jesuits reported an outbreak of smallpox in the Laguna region of northern Durango (Figure 16).

In 1591 the Jesuits established a permanent residence in Zacatecas, and two years later, several Jesuits moved into a permanent residence in Durango, which became the headquarters for mission operations along the eastern slopes of the Sierra Madre and in the mountains around Topia. While the residence was being prepared, Fathers Juan Augustín de Espinosa and Gerónimo Ramírez initiated contact with the Zacatecan and Irritilla of what became the Mission of Laguna and Parras. During the summer of 1594, the two priests traveled from Zacatecas to Cuencamé, the former site of a Franciscan mission and a village with some thirty Zacatecan families, many of whom had dealings with Spanish miners and ranchers.

While Ramírez preached to the inhabitants of Cuencamé, Espinosa continued northward to a Zacatecan village at the base of the Sierra Gorda. There, Espinosa was visited by numerous Irritilla caciques from the Laguna region and three from the Río Nazas. The caciques begged Espinosa to visit their pueblos, where many of their children reportedly were dying of smallpox. Espinosa acceded to their request and in one pueblo baptized seventeen or eighteen children who were sick and in danger of dying (Alegre 1956:423-24; Pérez de Ribas 1944:III, 251-53). Significantly, Espinosa made no mention of adults or adolescents who
were ill. Rather, he noted only that he heard the confessions of ten or twelve “old Christians” who presumably were baptized by the Franciscans many years earlier (Alegría 1956:423). These “old Christians” as well as other gentle adults probably had an active immunity to smallpox that was acquired during one or more pre-Jesuit epidemics in Durango.

Our knowledge of the epidemic of 1594 in Durango is limited to a few lines from a brief account of Jesuit activities that year along the eastern slopes of the Sierras. It is not possible, therefore, to determine how far the epidemic spread. At the same time, the reports from central Mexico as well as Sinaloa and the Laguna region all suggest that a particularly virulent strain(s) of variola was current in 1593–94. Given the extensive movement of people and goods along the camino real of the interior and the Topia Road, we have to acknowledge the high probability that smallpox affected many serrano groups (i.e., Tepehuán, Acacée, Xóchime, Tarahumara, Conchos) whose aboriginal homelands were penetrated by these routes of contagion. The epidemic may well have spread to the La Junta area, which at the time was subject to Spanish slave raids (Griffen 1979:2).

The Post-Epidemic Years in Sinaloa and Durango, 1594–1600

Native mortality during the epidemic of 1593 brought in its wake serious consequences for the Jesuits in Sinaloa. After the epidemic had run its course, the priests were faced with the difficult task of convincing many of their neophytes who had fled their homes during the epidemic to return to their mission communities. This task was made difficult by food shortages and hunger, apparently a consequence of not being able to harvest crops during the epidemic (AGN 1594:36; 1596:62). Of perhaps even greater concern to the Jesuits was the fact that native beciberos or shamans took the offensive following the epidemic, accusing the priests of being the cause of disease. The beciberos’ charges did not fall upon deaf ears. Indeed, the epidemic had scarcely ended when a group led by a cacique and becibero from the village of Tovoropa plotted the murder of Father Tapia, the local superior and perhaps the most zealous of the Sinaloa Jesuits (Shields 1934). During a visit to Tovoropa on July 11, 1594, Tapia was slain and his left arm and head were cut off. The rebels then set fire to the church of Tovoropa, and with Tapia’s head on a pole, made the rounds of various native communities, holding mock processions (AGN 1594c; Pérez de Ribas 1944:1, 173–82).

Word of Tapia’s death quickly reached his Jesuit colleagues in their respective mission districts as well as the handful of Spaniards who resided in and about San Felipe. All took refuge at the villa where they awaited what they feared would be a general insurrection. Although a large number of Jesuit converts gave tacit approval of Tapia’s murder, no organized revolt materialized. Many natives who fled the missions apparently did so out of fear of Spanish reprisals, not because they accepted the beciberos’ assertion that the priests were responsible for disease. It was often difficult in this regard for the beciberos to convince people that the missionaries were the source of disease, inasmuch as the Jesuits worked tirelessly caring for the sick and did not themselves show signs of smallpox or measles.

Once it became apparent that the Jesuits only were interested in punishing Tapia’s murderers, it was possible for the Black Robes to reconstitute many of their mission communities. The missionaries were helped considerably in this regard by the arrival of several new missionaries in 1594. In January of the following year Captain Alonso Díaz and twenty-four soldiers also arrived at San Felipe. The establishment of a permanent garrison at San Felipe gave additional weight to Jesuit urging that their neophytes return to their missions.

Within several years, then, the Jesuits had repaired much of the damage done at the time of Tapia’s murder (AGN 1594, 1597, 1598). The forward march was not, however, without setbacks. In 1595, many Guasave, Nío, and Ocotonis fled their missions after Father Pedro Méndez discovered and then destroyed a native idol, giving rise to native fears of an epidemic (AGN 1596; Pérez de Ribas 1944:1, 186–87). There is reason to believe these fears were real and reflected continuing losses from disease, particularly children who suffered from chronic infectious maladies such as dysentery and malaria. Speaking of the years prior to 1600, Pérez de Ribas (1944:II, 36) noted that 6,000 “stainless infants” died during the early years of the Sinaloa missions.

During the years following the epidemic of 1594 in Durango, acute and chronic infectious diseases also took their toll among native populations along the eastern slopes of the Sierras. This much is apparent from reports compiled by Fathers Espinosa and Ramírez, who continued to make forays from the Jesuit headquarters in Durango among the Zacateco, Tepehuán, and Irriritl. On one such trip in 1598, Father Espinosa visited the Laguna region of Parras and was told by an old man that measles had wiped out at least one Zacateco community the year before (DHM 1598:48–49). In his report Espinosa also noted that among the children who were baptized in 1598 was a ten-year-old boy who was
suffering from malarial fevers that were occasioned by severe nose bleeding (DHM 1598:36).

In 1598 Father Gerónimo Ramírez left Durango and established the first Tepehuán missions at Santa Catalina, Santiago Papasquiao, and Guanauevi. It is perhaps indicative of the spread of measles the year before that at least some of Ramírez's converts were suffering from hunger and readily abandoned their homes in the mountains (DHM 1597:37). Food shortages and famine characteristically followed epidemics (AGN 1594:36), apparently because of the sudden loss of people to maintain crops or to conduct a complete and timely harvest.

The Epidemic of 1601-02

The epidemics of 1593 and 1594 in Sinaloa and Durango were the first of many epidemics documented by the Jesuits. Major epidemics came at regular five- to eight-year intervals, reflecting, in part, the coming of age of a new generation of susceptibles. Aboriginally, native women in northwestern Mexico apparently nursed their children for a minimum of two years (e.g., Hammond and Rey 1928:161). Once a child reached three or four and was no longer breast-fed, it was deprived of maternal antibodies that provided some resistance to disease. A letter of Father Pedro de Velasco from 1601 provides some support for this thesis. That year and the following one, northern Sinaloa was ravaged by measles and several other diseases (Figure 17). According to Velasco, the epidemic initially had little impact on infants. Those who suffered most were the elderly, "and more so women, and young people who had not yet reached juvenile age" (AGN 1601:109). This last group presumably included many children who had been born since the epidemic of 1593.

Like most disease episodes, the epidemic of 1601-02 appears to have originated with microorganisms that were introduced from central Mexico. Between 1595 and 1597, measles, typhus, and mumps reached epidemic proportions in New Spain (Gibson 1964:449; Grijalva 1924:216; Mendietz 1943:174-75; Ocaranza 1934:86). In 1596, the population of Nueva Galicia also suffered from an epidemic that was characterized by a swelling of the throat (hinchazones) (Tello 1891:714), a major symptom of measles and diphtheria. In 1601-02, Nueva Galicia again was affected by a great sickness (Tello 1891:730-31, 734), as was Sinaloa. According to Father Pedro de Velasco, the coocolótsi appeared suddenly in Sinaloa, afflicting "some in the same manner as tonsillitis or mumps; others lost their ability to speak or reason and became senseless and crazy." The epidemic persisted for three or four months, and just when it appeared that it would end, it reappeared, spreading in less than a day and a half and at times, in one day, from pueblo to pueblo, infecting those who had not previously suffered. Many reportedly died in two days and others in less than fourteen hours (AGN 1601:109-10).

Velasco's comments regarding the epidemic's high incidence, the prevalence of upper respiratory problems, the suddenness and rapid
spread of disease, and also his mention of individuals that developed a rash (AGN 1601:114) are all highly suggestive of measles (May 1958). The disease appears to have been particularly severe among the Ocotoni, Nio, and Guasave. While all three groups suffered during the epidemic of 1593, it was not until 1601 that the bulk of the population was integrated into the mission system, thus facilitating exposure to disease. Also, presumably those Guasave and Ocotoni who suffered in 1593 acquired a specific immunity to either measles or smallpox, not to both diseases. This may explain Velasco's comment that there was an abundance of Old Christians among the Guasave who died during the epidemic (AGN 1601:116). Velasco further noted that 58 of 128 Ocotoni adults died who were baptized in 1601 (AGN 1601:110).

Velasco said little in his letter that would indicate the older missions near San Felipe and along the Rio Mocorito suffered greatly during the epidemic. The priest mentioned that those near the villa prayed and went to confession, hoping to escape the cocolazi. The inhabitants of the Rio Mocorito also “were quiet,” although Velasco noted that the inhabitants of two pueblos and part of a third fled their missions for the mountains, along with natives from pueblos on the Rio Lopoche. Those who fled were convinced to return to their pueblos. It is conceivable that this exodus occurred at the time that the Nio, Ocotoni, and Guasave were affected by the epidemic.

After apparently subsiding late in the summer or early fall, the epidemic of 1601 continued during the spring of the following year. The anna of 1602 indicated that “sore throat” and six or seven other diseases, including smallpox, measles, and typhus, became so widespread that “there were very few people who did not have [at least] one of them” (AGN 1602:123–26). In a letter apparently written in 1603, Captain Diego Martinez Hurdaide commented that 4,000 of the Jesuits’ converts on the Sinola River had perished from pestilence or war (Dunne 1940:75). Those who perished in war apparently included Cahuilla converts who fought alongside Hurdaide in a punitive expedition against the Suaqui in 1602 (AGN 1602; Dunne 1940:58–62). If so, then only a fraction of the 4,000 natives mentioned by Hurdaide died from battle wounds; the vast majority must have died from disease.

As was the case the previous year, the epidemic in 1602 wreaked havoc among the Jesuits’ most recent converts. The anna of 1602 noted that many of the 243 infants and 274 adults who were baptized among the Guasave subsequently died. In the three older partidos or mission districts of the Rio Mocorito, San Felipe, and Rio Ocotoni, 278 infants were baptized in 1602, many of whom were said to have perished.

While the anna indicated 54 adults also were baptized in these same three partidos, none were reported to have died (AGN 1602:129–30). Presumably, these and other adults had weathered one or more earlier bouts with Old World diseases.

In the anna of 1602 there are several accounts of Suaqui Indians who were ill and came south to be baptized (AGN 1602:128). These accounts suggest that the epidemic spread to the middle Rio Fuerte. Presumably, the Tehuaco and Cinaloa, who lived upstream from the Suaqui, and the Ahone, who lived downstream, also suffered during the epidemic. Although at the time of the epidemic the Suaqui, Tehuaco, and Cinaloa were cool or hostile toward the Jesuits, each group had contact with the Black Robes and with fellow Cahuilla or Guasave speakers under mission tutelage. One way in which disease could have spread to gentile communities was suggested by Father Juan Bautista Velasco in his letter of 1601 to the father provincial. Father Velasco related in his letter how he had tried on numerous occasions to convince an old man to accept baptism, and after the man refused, Velasco told the man to leave the mission settlement and to go live in a gentile community. Several days later the man, who apparently left the mission with an infection, developed symptoms and died (AGN 1601:117).

Tehuaco exposure to disease in 1601–02 is suggested by the fact that in 1605–06, the Jesuits convinced the Tehuaco to abandon one of their three pueblos, apparently following significant population losses during the epidemic of 1601–02 (Pérez de Rivas 1944:1, 313). Similarly, in 1605–06 the Jesuits had the Cinaloa abandon some of their settlements and concentrate in three villages with a total of 1,000 families (Pérez de Rivas 1944:1, 344). It may be recalled that Diego de Guzmán’s expedition reported in 1534 that the Cinaloa lived in twenty to twenty-five towns with 100 to 300 houses (Hedrick and Riley 1976:41). As late as 1594, when Father Tapia visited the Cinaloa, he found “many people distributed in 24 villages or rancherías” (Pérez de Rivas 1944:1, 174–75).

Presumably, as a consequence of the epidemic of 1601, and also that of 1593, the Cinaloa population had been reduced dramatically. Along these lines, Sauer (1953:19) noted that when Captain Hurdaide visited the Cinaloa and Tehuaco in 1605, he reported a ratio of only two women and children for each warrior. Sauer believed Hurdaide made no

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7 Natives from the Rio Fuerte regularly traveled to the Rio Sinola during the years prior to 1600. As an example, the anna of 1595 relates how a Tehuaco who was traveling from the Rio Mocorito to the Rio Fuerte was killed and decapitated by a group of apostate Cahuilla (AGN 1595). The man, or rather his head, was identified by a group of Tehuaco from the Rio Fuerte who were visiting San Felipe.
real effort to count small children. It seems more likely, however, that the Tehuero and Cinaloa lost many children and expectant mothers during the epidemic of 1601-02.

The \textit{anua} of 1602 contains a letter by an unnamed priest indicating that the epidemic of 1601-02 spread for a considerable distance to the south, at least as far as the Culiacán Valley. Although the Jesuits did not establish a mission in the valley, they occasionally visited the Tahuí or worked there briefly while en route to San Felipe. In his letter, the priest noted that he spent fifteen days in the Culiacán Valley, visiting some twenty pueblos where many natives died from a furious \textit{socolizti} (AGN 1602:136). The priest reportedly spent another week or so visiting the Tetebatas, a subgroup of the Acaxee who lived in the foothills above the Río Culiacán. From the priest's comments, particularly his observation that the natives were "more healthy in body than in spirit," it appears that the Tetebatas were spared by the epidemic.

The apparent failure of measles and other diseases to spread up into the foothills among groups like the Tetebatas is perhaps attributable to the Acaxee revolt, which halted the movement of people, goods, and presumably disease agents to and from Sinaloa and the Sierras. The revolt occurred in September 1601, not long after Sinaloa was stricken with disease. During the revolt, several thousand Acaxee destroyed mines and related Spanish settlements at Topia, San Andrés, San Hipólito, San Gregorio, and Las Virgenes.\footnote{As at the time of the revolt, there were upwards of eighty Spaniards and an unknown number of black slaves and Indians from the south working silver deposits in and about the \textit{mrz}. There also were several Franciscans resident at Topia (Medrano 1609:60-63).} Among the many Spaniards who fled in the wake of the rebellion were several Jesuits. In 1598, the Jesuits received permission from the Crown to establish a permanent mission among the Acaxee. With the assistance of Captain Diego de Avila, Father Santarén and several other Jesuits convinced several thousand Acaxee in over a dozen villages and numerous rancherías to accept mission tutelage. This acceptance soon spread and many Jesuit converts joined the revolt in 1601, forcing the Black Robes to flee the Sierras along with other Spaniards.

Around the time of the Acaxee revolt, Father Santarén, who was the superior of the missions of Topia and San Andrés, wrote several lengthy reports on the Acaxee missions. Significantly, Santarén made no mention of an epidemic or disease being widespread in the Sierras, although he did discuss a number of what appear to be isolated instances of natives suffering from indeterminate maladies (DHM 1600, 1601; Alegre 1958:74-94, 499-512, 542-49; Pérez de Ribas 1944:III, 13-22). It thus would appear that the Acaxee were unaffected by the epidemic in 1601-02. Once the Acaxee revolt began and the Jesuits and other Spaniards fled the Sierras, all trade and communication with Sinaloa ceased (Dunne 1944:57, 59). This situation remained throughout the duration of the Acaxee revolt—until the fall of 1603—and may very well have inhibited or blocked the spread of disease from Sinaloa up into the mountains to the east.

There was little, however, to impede the movement of disease from central Mexico up the eastern slopes of the Sierras, as was the case in 1594, when Father Espinosa reported an outbreak of smallpox in the Laguna region. In a letter in the \textit{anua} of 1601, recounting the founding of a permanent mission at Parras among the Irritilla of the Laguna region, Father Nicolás de Arzaya noted that there had been a number of mission converts who died after being baptized and others after receiving the sacraments (DHM 1601:69-70). Pérez de Ribas (1944:III, 237-59) also related a number of instances where Irritilla who were sick were baptized and subsequently died. Pérez de Ribas further noted that the missionization of the Irritilla of Parras was coincident with the same population decline as occurred in other areas.

It is significant that although Arzaya did not mention disease, he did note that all but a handful of the 1,500 natives of Parras abandoned their mission following the death of those who were baptized, and who presumably were ill. The natives' decision to flee their mission settlement could have had either positive or negative effects. If at the time Parras was abandoned many natives were in the incubation and nonsymptomatic stages of smallpox or measles, then the act of abandoning the mission could have helped spread disease throughout the Laguna region. Alternatively, if the mission was abandoned before a large number of people contracted one or both diseases, then the abandonment of Parras would have reduced the chances of the outbreak reaching epidemic proportions. As we shall see, in 1607-08, the Irritilla and Zacateco of the Laguna region were devastated by measles and several other diseases. The fact that so many natives suffered during this later epidemic supports the idea that many were spared the ravages of disease in 1601-02.

The Epidemic of 1606-07

As often was the case, the Jesuits had to convince many of their neophytes in Sinaloa to return to their missions, which wholly or partially had been abandoned during the epidemic of 1601-02. Native
doubts about the efficacy of Christianity again resurfaced during the epidemic and were intensified by the bejniceros who pointed to the missionaries as the source of sickness and death. The Black Robes also had to cope with crop failures and hunger that often were associated with epidemics. Food shortages in 1603 intensified the following year when heavy rains destroyed native and mission crops on both the eastern and western slopes of the Sierras (AGN 1604; Pérez de Ribas 1944:11, 25; Dunne 1944:73). Poor nutrition undoubtedly lowered native resistance to disease and apparently increased the infant mortality rate. The anua of 1604 relates that there were many children recently born, who upon receiving holy baptism, died (AGN 1604:139–40). In 1604, the death of many children and growing hunger prompted many Guasave, Ocoroni, and Bacuburito converts to abandon their missions. The natives also set fire to several churches and then fled to the mountains along the headwaters of the Río Sinaloa. Still another group of some forty Ocoroniis fled to the Río Mayo and, after being turned away, continued on to the Río Yaqui, where the Yaqui provided them refuge (AGN 1604; Pérez de Ribas 1944:1).

In 1606–07 the Jesuit missions of the north were dealt another blow in the form of a major epidemic of smallpox, measles, and other diseases (Figure 18). The epidemic affected mission and gentile communities in the heart of the Sierras and on both the eastern and western slopes of the Great Divide. Prior to their appearance in the north, measles and smallpox, otherwise termed cocoyotis, reached epidemic levels in Guatemala and southern Mexico (Alegre 1958:145; Gibson 1964:448). In 1606–07, priests and novitiates at the Jesuit College in Tepotzotlan, some thirty miles north of Mexico City, were called upon to care for many Otomi Indians who were stricken by disease (Alegre 1958:144). Interestingly, the Jesuit College at Tepotzotlan may have been the point of departure for several Jesuits who were sent to Sinaloa late in 1606—about the time that measles and smallpox appeared in the north (Alegre 1958:162–63; Pérez de Ribas 1896:214; 1944:31, 342).

Much of what we know about the epidemic of 1606–07 comes from Pérez de Ribas’s Historia (1944). At the time of the epidemic, Pérez de Ribas was himself working among the Ahome and Suaquis along the lower and middle Río Fuerte. As we have seen, both groups apparently were affected by the epidemic of 1601–02. It is unclear whether the Ahome and Suaquis suffered greatly in 1606–07. Pérez de Ribas made no explicit mention of the Ahome or Suaquis suffering during this later epidemic. At the same time, Pérez de Ribas implied in his discussion of the founding of missions among the Suaquis that the number of Suaqui vecinos or heads of household declined from 1,000 to 800 between 1605 and 1607 (Pérez de Ribas 1944:1, 305–6). He further alluded to the epidemic having spread among the Baracaua, hunter-gatherers who exploited the coastline some four leagues (seventeen kilometers) from the pueblo of Ahone. Pérez de Ribas (1944:1, 289) noted that he convinced some 300 Baracaua to settle close to the Ahone, and that many were castigated by God with sickness after the Baracaua fled their mission settlement, apparently in 1606.

The impression one gets from Pérez de Ribas and other sources (Alegre 1958) is that the mission population of the Río Sinaloa and the Río Mocorito were little affected by the epidemic. This finding is consistent with the fact that the Cahuí and Tabue of the Sinaloa and Mocorito rivers had been exposed to measles and smallpox in 1593 and again in 1601–02. Predictably, the epidemic of 1606–07 had its greatest impact on the Jesuits’ newest converts, the Tehuaco and Cinaloa of the upper Río Fuerte. Although both groups apparently were affected by the epidemic of 1601–02, there were still many Tehuaco and Sinaloa in
1601 who were hostile toward the Jesuits and accordingly avoided contact with Spaniards or Jesuit converts.

In 1605, Fathers Méndez and Villalta began regular visits to the Tehuaco and Cinaloa, baptizing the children and explaining Christian doctrine to the adults. These visits continued until late the following year when Méndez and Villalta received a license from the viceroy enabling them to reside permanently with their neophytes. No sooner did the priests take up their new residences, in November 1606 (Alegre 1958:120), when smallpox and measles struck. In one of three Cinaloa settlements under Villalta’s care, the priest cared for 300 natives who became ill in one day. In other mission partidos the Jesuits also had to cope with high case frequencies. More disturbing to the priests was the large number of natives who perished. The dead reportedly numbered in the thousands (Pérez de Ribas 1944:1, 346).

Although direct evidence is lacking, the Bacicua, Conicati, and other native peoples in the foothills above the Tehuaco and Cinaloa may also have been affected by the epidemic of 1606-07. The Bacicua and Conicati were two of many groups that visited Father Méndez while the latter was working among the Tehuaco (Pérez de Ribas 1944:1, 312). Similarly, shortly after Father Villalta began visiting the Cinaloa and prior to the establishment of a permanent mission, the priest was visited by a principal chief of the Zoé who asked for baptism for his people (Pérez de Ribas 1944:1, 343). Significantly, Pérez de Ribas and other sources tell of natives from the foothills who traveled great distances in 1606 and 1607 to plead for priests and baptism, apparently believing or hoping that baptism would provide a cure for disease. In one instance, a group who “lived far away and from another part of the [Fuerte] river” swam part of the way, bringing their infants to be baptized (Pérez de Ribas 1944:1, 343).

Two other groups, the Chicaroro and Cahuemeteo, also had extensive contacts with the Jesuits as well as other Spaniards (Dunne 1940:98; Pérez de Ribas 1944:1, 242-43) and were likely to have suffered during the epidemic. In February 1607, Father Pedro Velasco, son of the viceroy of New Spain, Diego de Velasco, visited the Chicaroro, Cahuemeteo, and Oguera and baptized over 500 of their infants. Several years later, in a letter to the Jesuit provincial in Mexico, Father Velasco noted that during his first three years as a missionary he baptized 1,900 natives of whom 300 died (AGN 1610; Alegre 1958:162-63; Pérez de Ribas 1944:1, 247).

There is good reason to believe the Mayo and Yaqui also were affected by the epidemic of 1606-07. Prior to the epidemic, a delega-
nowhere in his letter does Fonte indicate or suggest that the parents of the child or other adults and adolescents contracted smallpox. The Tarahumara, it appears, had suffered from smallpox previously, perhaps as recently as 1604 when the Tepehuan of Zape were affected by disease. Interestingly, Pérez de Ribas (1944:III, 223–24) copied part of a letter that apparently was written in 1604, in which Fonte noted that he was visiting the mining community and mission of Indé by a large group of what appears to have been Tarahumara. The natives reportedly traveled for six or seven days “from the interior” to ask Fonte to visit their lands, presumably to baptize many who were dying from disease.

During the closing decades of the 1500s, the Tarahumara, Concho, Tepehuan, and other native peoples in southern Chihuahua traded with and were employed or enslaved by Spanish miners, ranchers, and merchants of the Santa Bárbara-San Bartolomé district (Griffen 1979; Miranda 1871). It would not be surprising if this district was one of several hierarchical centers from which smallpox spread to groups like the Tarahumara in 1607. Although it is unknown whether the Santa Bárbara district suffered in 1607 from smallpox, we know that the Laguna region to the southeast of Santa Bárbara was devastated that year.

Prior to the epidemic, the Jesuits had made considerable progress among the Irritilla. By 1601, Fathers Augustín de Espinosa and Francisco de Arista were attending to the needs of some 1,600 neophytes at Santa María de las Parras. The two priests also had organized the missions of San Pedro and Santa Ana, each with barrios of Zacateco and Irritilla converts. Although the Parras mission was dealt a momentary setback in 1602 with the death of Father Espinosa, the following year (1603 or 1604) four priests were sent northward to assist Arista. Within a year of their arrival, a new mission was founded at San Ignacio and two visitas (San Gerónimo and Santo Tomás) were established in the partido of San Pedro. The Jesuits also began regular visits to other smaller native settlements in the Laguna region (e.g., Santiago and San Nicolás), and by 1604, over 5,000 natives were under Jesuit care. The number of converts continued to grow during the two years leading up to the epidemic and included several hundred natives who abandoned their homes in the Sierra de las Parras (Dunne 1944; Pérez de Ribas 1944:III, 276–83).

Several accounts of the epidemic of 1607 (Dunne 1944:110–15; DHM 1607; 1608; Pérez de Ribas 1944:III, 273–85) indicate that smallpox raged for many months in the Laguna region, all but destroying many mission and gentile settlements. Only one or two people survived in some rancherias where there previously were 100 or more inhabitants (Pérez de Ribas 1944:III, 281). In the anna of 1607 it was noted that

roughly the same time as in Sinaloa, southern Sonora, and northwestern Durango. At the time, 1607, the Tepehuan mission had grown considerably and included permanent missions at Santiago Papasquiaro, Santa Catalina, Guanacevi, Indé, and Zape. In October 1607, Father Juan Fonte also founded the mission of Santa Cruz in the district of Ocotlán, along the Tepehuan-Tarahumara border. It was apparently during the spring of 1607 when smallpox appeared at Santiago Papasquiaro, Santa Catalina, Indé, and Zape.

Interestingly, while many Tepehuan counted contracted smallpox, it was primarily Tepehuan gentiles in communities near the Tepehuan missions who suffered and died (Alegre 1958:154). Although Alegre states that the Christian Tepehuan fared better because they were cared for by their resident priests, Tepehuan living in mission settlements also had more immunity to disease, some of which was acquired during a smallpox epidemic in 1604 (Alegre 1958:105–6; Pérez de Ribas 1944:III, 147–49). It is not surprising, therefore, that Tepehuan gentiles suffered most in 1607, given their lack of an acquired immunity to smallpox.

The extent to which smallpox affected mission and nonmission communities on the eastern slopes of the Sierras is reflected in a letter describing Father Juan Fonte’s first entrada among the Tarahumara (Pérez de Ribas 1944:III, 159–61). Scholars have disagreed about the timing of Fonte’s entrada (see Decorme 1941:II, 249; Dunne 1944:94; Sheridan and Naylor 1979:156; Spicer 1962:23), with some suggesting it occurred as late as December 1610 or January 1611. Yet, several important details often have been overlooked that indicate Fonte’s entrada occurred in 1607. Specifically, Fonte noted that, after his visit to the Tarahumara, he went to Durango to speak with the governor of Nueva Vizcaya about securing the viceroy’s support for a permanent mission among the Tarahumara. Fonte further noted that the governor assured him that he would speak to the viceroy on Fonte’s behalf (Pérez de Ribas 1944:III, 159–61). Significantly, Fonte’s trip to Durango and his meeting with Governor Urdiñola are recounted in another of Fonte’s letters dated April 22, 1608 (Alegre 1958:169–70). It is apparent, therefore, that Fonte’s first visit to the Tarahumara occurred during the previous year, apparently in November 1607.

Fonte visited the Tarahumara after a group of caciques traveled to his Tepehuan mission of Santa Cruz and requested priests and baptism. He reported that he traveled eighteen leagues beyond the Valley of San Pablo, preaching in various Tarahumara settlements, where he also baptized some children who were sick and dying, including one child who was quite ill with smallpox (Pérez de Ribas 1944:III, 160). Importantly,
some natives died along the roads and in the open country outside what apparently was Mapimi, where some Laguneros were employed by Spaniards (DHM 1607:83–86).

Indians fleeing the missions also carried the epidemic up into the hill country near Parras. Among those who fled were fifty natives from the Sierra de Quauila. These seranos were part of a group of 350 that left their homes in the mountains and settled at Parras late in 1606 or early in 1607. According to Pérez de Ribas (1944:III, 280), "the better part of 300" died from smallpox, prompting the remaining fifty to take refuge in the Sierras. Several priests reportedly followed the natives, hoping to convince them that there was no necessary correlation between mission life and death from disease. The priests successfully advanced several arguments, one of which reminded the natives "that they had suffered from epidemics in their gentility, before Priests and Christian doctrine had entered their lands" (Pérez de Ribas 1944:III, 280). Here we have additional evidence that Old World diseases outdistanced the mission frontier in northern New Spain.

The Epidemic of 1612–15

The great suffering and loss of life caused by the epidemic of 1606–07 once again heightened native concerns regarding the acceptance of alternative behaviors, beliefs, and priests. Doubts about the efficacy of Christianity first surfaced among the Jesuits' newest converts. In 1610, several hundred Xixime staged a short-lived revolt (AGN 1610; Dunne 1944:97–108; Pérez de Ribas 1944:III, 86–95). The revolt was coincident with an outbreak of smallpox in an Acatec village near the Acatec-Xixime border (AGN 1610; Pérez de Ribas 1944:III, 95). It is not unlikely that the Xixime learned of this disease episode and, fearing for their own lives, decided to rid themselves of the Jesuits and other Spaniards, who were thought to be the source of disease. A year or so after the Xixime revolt, in 1612, another of the Jesuits' more recent converts, the Tehuaco of the Rio Sinaloa, rebelled against mission life. Like the Xixime revolt, the Tehuaco revolt was coincident11 with an outbreak of smallpox, which is known to have affected one of two Cinaloa missions upstream from the Tehuco (Pérez de Ribas 1944:1, 350). Because most Cinaloa adults had weathered earlier bouts of smallpox, the epidemic affected primarily children, some 300 boys and girls, many of whom died (AGN 1612; Dunne 1940:33–39; Pérez de Ribas 1944:1, 320–31). Although we lack direct evidence, neighbors of the Cinaloa like the Zoe, Huíte, and Chínipa, all of whom had less exposure to smallpox, may well have been affected by the disease in 1612.

That same year the Sinaloa missions experienced an epidemic of typhus (el tabardillo) (AGN 1612:163). The epidemic may have originated with Rickettsia that were carried northward from Jalisco, where many natives died in 1610 and 1611 from a great sickness (Tello 1891:769). More precisely, the disease may have been introduced by the bishop of Guadalajara or those who accompanied him to Sinaloa in 1611. The bishop made an unprecedented journey to the northern frontier to administer the sacrament of confirmation to some 8,000 Jesuit converts who assembled at San Felipe with an unknown number of well-wishers (Pérez de Ribas 1944:1, 317). The week-long gathering at San Felipe would have provided an ideal context for the introduction and spread of a disease like typhus, which often occurs under crowded conditions. Many natives unknowingly could have contracted typhus and/or other maladies, only to have the disease manifest itself after the natives had returned to their respective villages.

The typhus epidemic of 1612 continued the following year, exacting its heaviest toll among children (AGN 1613:168). From Sinaloa, typhus and other maladies apparently spread up into the mountains to the east (Figure 19). Several sources indicate that the Acatec and Xixime missions of Topia and San Andrés suffered in 1613 from el cocoliztli and bloody stools (Alegre 1958:244–45; Pérez de Ribas 1944:III, 106–7; Dunne 1944:111). The term cocoliztli, which often was used in a general sense to refer to disease, probably was used here as a referent for typhus. Bloody stools is suggestive of typhoid and/or dysentery. As we have seen, typhus, typhoid, and dysentery have a long history of working together. Judging from Pérez de Ribas's (1944:III, 107) comments, the Xixime were particularly hard hit by the epidemic. Although Decornie (1941:II, 33–34) stated that the Laguneros also were devastated by smallpox and cocoliztli in circa 1612, it appears that he confused the epidemic of 1606–07 with that of 1612–13. It is unclear what impact the epidemic had on the Laguneros as well as Tepehuán and Tarahumara.

During the epidemic of 1612–13, typhus and other infectious disease spread far beyond the mission frontier in southern Sonora. Some
supply of food from the Nébome or Pima Bajo (AGN 1614a; 1614b; Alegre 1958:253–54; Pérez de Ribas 1944:II, 14–15). The food was distributed in six mission communities where Mendoza baptized several thousand Mayo children and adults. Significantly, a good number of those who were baptized apparently were sick and in danger of dying. In a letter to his superior, Mendoza reported that he baptized 3,100 infants and 500 adults, “not counting the old and sick, in danger of dying, of whom there were another 500, who, after being baptized, shortly thereafter departed to be with our Lord” (Alegre 1958:255). Later, in December of that same year, Mendoza again wrote to his superior, recounting several “edifying cases” of natives who suffered from various unspecified maladies and died or regained their health after being baptized. Mendoza commented that “it is a thing of great consolation that many times I have made the rounds of the pueblos, baptizing the sick, and on my return I discovered that all, or almost all of them had been taken by our Lord” (AGN 1614a:189–93; Pérez de Ribas 1944:II, 19–23).

The disease(s) that was afflicting the Mayo may well have spread to the Nébome or Pima Bajo of the middle Río Yaqui. As early as 1610, the Nébome and their neighbors the Nuri visited San Felipe, professing a desire for priests and friendly relations with Captain Hurdaide (Dunne 1940:257n5; AGN 1614a). Subsequently, the Nébome occasionally were visited by Christian kinsmen from Bama—descendants of those who left Sonora in the company of Cabeza de Vaca (Pérez de Ribas 1944:II, 253–56). The Bamaans could have harbored chronic infectious diseases such as typhus, which can be retained for years as a subclinical infection. Significantly, in January 1613, 350 Pima Bajo left their homes along the middle Río Yaqui and traveled to San Felipe.12 During the spring of the following year, 1616, another 174 Nébome left their village in the Sierras, as did a third group late in 161613 (AGN 1616). Although the Jesuits attributed this exodus to an impatience for baptism, it is apparent that the Nébome hoped that baptism would provide some measure of protection from and a cure for disease. Pérez de Ribas (1944:II, 255–56), in fact, noted that three of the adults who came south in January 1615 died en route, and another five died after they reached

12 One indication of the close ties between the Pima of Bama and the Nébome is the fact that a Bamaan came south with the first group of Nébome in January and reportedly taught them the rudiments of Christianity along the way (AGN 1615a).

13 The anua of 1615 contains a letter of Father Diego de Guzmán that recounts the Nébome exodus (AGN 1615; Alegre 1958:563–69). Guzmán’s letter was copied and included in the Memorias (AGN 1615b) and is mistakenly represented as being written in 1620, rather than 1615.
San Felipe. Pérez de Ribas (1944:1, 255–56) further noted that one native who came south in January arrived at San Felipe in a “death trance...so leprous that there was not a part of his body, from his head to his feet, that was free of disease.” Pérez de Ribas, like other Spaniards (Gibson 1964:448) and fellow Jesuits (AGN 1601:114), apparently used the term leprous to refer to septic pustulation, which is common in neglected cases of smallpox, measles, and typhus. It is conceivable, however, that he referred specifically to leprosy, which was brought to the New World shortly after the Conquest (Rogers and Muir 1946).

The Epidemic of 1616–17

At the height of the Nébome exodus in 1616, northern Sinaloa and southern Sonora were beset with an epidemic of what may have been measles and/or smallpox. Our knowledge of this epidemic comes mainly from a letter written in June 1617 by Pérez de Ribas (HCB 1617). In his letter, he noted that the province of Sinaloa had suffered for a year from *el cocolizati*. The epidemic presumably originated in central Mexico, where measles and smallpox reached epidemic proportions in 1613 and 1616 (Gibson 1964:449; Grijalva 1924:260). Tello (1891:807) mentioned an outbreak of smallpox in Jalisco in 1617. The epidemic apparently continued the following year and was referred to by Arregui (1946:26–27) as *cocolizati*.

In his letter, Pérez de Ribas noted that the Yaqui were suffering from *el cocolizati* at the time he and Tomás Basilio founded the first permanent missions among the Yaqui in May 1617. During their first six weeks among the Yaqui, the two Jesuits reportedly baptized 1,600 infants, a large number of whom died. Another 100 adults, almost all of whom were sick and in danger of dying, were also baptized. However, of these, only some reportedly died (HCB 1617:994–95). This apparent low case frequency and mortality rate for adults strongly suggests that the Yaqui had suffered from *el cocolizati* on a previous occasion—perhaps in 1612, when smallpox appeared among the Cinaloa. Like the Mayo, the Yaqui had been in contact with the Jesuits and with other Cárdenas under mission tutelage for years before Pérez de Ribas and Basilio established a permanent mission. This sustained contact began in 1609, when the Yaqui mysteriously sued for peace after soundly defeating Captain Hurdaide in several pitched battles (e.g., AGN 1615:209; Pérez de Ribas 1944:II; Spicer 1980).

The epidemic that afflicted the Yaqui in 1617 affected numerous groups in the foothills and mountains of southern Sonora (Figure 20).

Figure 20. The epidemic of 1616–17

Pérez de Ribas implied as much when he noted that he and Basilio were visited by delegations of Nures, “Zoes” (Zoés?), Yhios (Vachios), Bactios, Téaribes, Téhitas, Cenicaris, Tepague, and other groups that brought their sick children to the Rio Yaqui to be baptized. According to Pérez de Ribas, these *seranos* also petitioned Father Diego de la Cruz to come to their lands. La Cruz, who had recently joined Father Méndez among
the Mayo, acceded to the natives' request and in one day baptized over 100 individuals (HHB 1617:947–49). Again, the Jesuits were governed by strict rules and regulations regarding baptism of gentiles and the founding of new missions, and so La Cruz must have felt that many of those he baptized were in danger of dying, presumably from disease.

At the time the Yaqui and other groups in northern Sinaloa and southern Sonora were suffering from smallpox and other maladies, native peoples in the mountains to the east were engaged in the Tepehuan revolt. The uprising began in November 1616, involving a rebel force numbering in the thousands drawn from dozens of communities throughout the Sierras (Pérez de Ribas 1944:III, 162–207). As in earlier uprisings, the rebels were led by a number of bechiceros who warned the people that they would be punished with great hunger and sickness if they did not rid their lands of all Spaniards, including the Jesuits (Nieremberg 1889:357; Pérez de Ribas 1944:III, 165, 183–86). Although direct evidence is lacking, it is not unlikely that the bechiceros began fomenting revolt as word reached the Sierras of a major epidemic in Sinaloa.

Importantly, during the Tepehuan revolt, which was not quelled until 1618, trade and communication via the Topia Road ceased (Dunne 1944:164). It is possible, therefore, that the introduction and spread of smallpox and/or measles was limited in 1616–17 to the Pacific slopes of the Sierras. This inference is supported by the fact that Spaniards who quelled the revolt and who participated in the repatriation of the Tepehuan and other rebels made no mention of an epidemic in the Sierras prior to or during the revolt.

The Epidemics of 1619–20 and 1623–25

During the Tepehuan revolt, ten priests (eight of whom were Jesuits) were killed along with several hundred other Spaniards, black slaves, and Christian Indians. Mission settlements as well as Spanish communities, mines, and ranches throughout the Sierras were destroyed. When the revolt finally was crushed in 1618, the Jesuits were faced with the difficult task of reconsecrating dozens of mission communities that were destroyed or abandoned during the uprising. The mission frontier along the Pacific slopes of the Great Divide meanwhile continued to advance northward. In 1619 there were tens of thousands of gentiles in Sonora that had petitioned in earnest for priests and baptism. Many of these petitions followed the epidemic of 1616–17 when one or more maladies spread well up into the foothills and mountains of southern Sonora. In 1619, Sinaloa and Sonora again suffered from famine and disease (AGN 1619a:241). Among those affected were the Yaqui, many of whom reportedly died from el cocoliztli (AGN 1620:269). The Nébome or Pima Bajo apparently also suffered at this time (Figure 21). After more than a decade of petitioning for priests, in June 1619, Father Diego de Guzmán visited the Nébome and baptized over 1,700 children and adults, many of whom apparently were in danger of dying (AGN 1619a; 1619b; Bannon 1955:28–29; Pérez de Ribas 1944:II, 151).

Around the time of Guzmán's entrada, an unnamed Jesuit also paid a visit to the Ayivino, a branch of the Eudeve-Opata who were centered about the Rio Mátape. The annua of 1620 (AGN 1620:256–57) contains several accounts of sick natives who subsequently died, suggesting that the Ayivino also suffered in 1619–20 from Old World disease. The annua relates one instance in which a Nébome happened upon an Indian woman of a "enemy nation" who was sick and on the verge of death. The Nébome took the woman, who apparently was Eudeve-Opata, to an unnamed priest working among the Ayivino. The priest baptized the woman and in a few days she died (AGN 1620:257). Another instance is given of a gentle woman who lay sick in front of her house and was found by the same priest. The woman agreed to be baptized and died within fifteen minutes (AGN 1620:256–57). Although there is no indication from what these women died, elsewhere in the annua mention is made of natives who suffered in 1620 from "vicious" and "great" fevers (AGN 1620:255, 257).

The food shortages and outbreaks of disease that plagued Sinaloa and Sonora in 1619–20 continued for several years (AGN 1621; AGN 1622), setting the stage for one of the most destructive epidemics of the seventeenth century. The epidemic that began in 1623 eventually affected settlements as distant as Zacatecas and Ures, along the Río Sonora. Several sources noted the epidemic was the worst that had ever been seen, killing large numbers of natives on both the eastern and western slopes of the Great Divide (AGN 1623:90; AGN 1625:138). As often was the case, a variety of maladies were involved in the epidemic, although most accounts of the epidemic emphasize the lethal impact of smallpox (AGN 1626:148).

In the annua of 1625, Father Juan Lorencio wrote that the epidemic began in Sinaloa in October 1623 and lasted for two years, finally subsiding in 1625 (AGN 1625:157–38; AGN 1626:144). Over the course of many months, the Jesuits worked day and night attending to countless natives who contracted smallpox, typhus, pneumonia, and other maladies. In some villages the priests had to care for 400 people who were ill
at one time. The job of caring for the sick was made difficult by an unprecedented famine that coincided with the epidemic. Hunger and disease prompted many natives to abandon their missions and to flee into the foothills or scrubland of the coastal plain (AGN 1623:93; 1625:139). In response to this exodus, some priests traveled over 400 leagues (840 kilometers), attending to the sick and burying the dead (AGN 1623:95). Father Lorenzo noted in the annua of 1625 that more than 8,600 natives died during the epidemic in Sinaloa and Sonora alone. Significantly, Lorenzo further noted that this number excluded all those who died without the benefit of the sacraments, many of whom perished in the monte or scrubland surrounding the missions (AGN 1623:137).

Although it is clear from the annua that large numbers of natives suffered and died in Sinaloa and Sonora, the areal extent of the epidemic remains unclear (Figure 22). Many priests apparently were too busy to compile reports on the status of their respective missions. Accordingly, Father Juan Lorenzo, who compiled the annua of 1624, noted that he did not receive reports from superiors in Sinaloa and Topia/San Andrés for that year (AGN 1624:123).

Because older mission communities repeatedly had been exposed to maladies like smallpox and typhus, the epidemic exacted its heaviest toll among the Jesuits' newest converts. At the time of the epidemic (1623), the Jesuits had recently organized two mission districts or partidos along the middle Rio Yaqui, principally among the Nébome or Pima Bajo. Although the annua largely are silent about the fate of these missions during the years spanning the epidemic, Pérez de Ribas (1944:11, 157) noted that many Nébome children and adults died during the first few years of missionization. The Nébome of the middle Yaqui were probably not the only Pima Bajo, however, that were affected by the epidemic of 1623–25. The annua of 1623 indicates that Pima Bajo from Ures (Hures), along the middle Rio Sonora, regularly visited the Jesuits as well as their Nébome relatives32 (AGN 1623:95–96). These visits could well have led to the spread of disease to Ures and other Pima Alto communities and may explain the Ures' great interest in baptism. The annua of 1623 noted in this regard that the "Hures" had shown a great desire for baptism, even though priests had not yet visited their lands or baptized their sons. Indeed, the Hures in 1623 already had prepared a residence for a priest as well as a ramada where the priest could celebrate mass.

32 The annua tells of four Nébomes who traveled to Ures to acquire maize and who shot a cacique during the visit. Of particular significance is the observation that, even though there were many relatives of the four assassins in Ures, the people of Ures decided not to seek revenge for their wounded cacique and instead sent word of what happened to a Jesuit among the Ayvino (AGN 1623:95–96).
also may have been affected by Old World diseases at this time. In 1619, both groups initiated regular contacts with the Jesuits, petitioning for priests and baptism. In June 1622, Fathers Basilio and Olifano made the first formal visit to the Ayvino pueblos of Matapa, Teopa, and Aybine. The priests baptized six sick adults and 402 infants, as instructed by their superior (AGN 1622). The following year the Ayvinos were visited by Captain Hurdaide, who encouraged the natives to maintain their desire to have priests. In a letter recounting his visit (AGN 1623), Hurdaide noted that Father Olifano, who worked among the Nébome, continued to visit the Ayvinos, and the latter often visited Olifano.

From the anna of 1620 (AGN 1620:254) we learn that the Batuco, another Eudeve-Opata group, also had initiated contacts with the Jesuits, as did the Sisibotari Opata of the Río Sahuaripa. In 1620, a delegation of Batuco caciques and the principal chief of the Sahuaripa Opata, Gran Sisibotari, traveled all the way to San Felipe to petition for priests and baptism. The Jesuits responded in kind by having an unidentified priest visit the Sisibotari, apparently baptizing some children or adults who were in danger of dying (AGN 1627:211). The priest may have accompanied a packtrain that Captain Hurdaide sent to Sahuaripa to secure foodstuffs (AGN 1622a). Again in 1621, Gran Sisibotari and neighboring caciques made the long journey to San Felipe, this time bringing a group of children who were left with the Jesuits for instruction (AGN 1621:284).

Prior to 1623, then, both the Batucos and Sisibotari were in close contact with the Jesuits. Such contact undoubtedly facilitated the spread of disease between 1623 and 1625. It is significant in this regard that when Father Pedro Méndez finally was sent to missionize the Sisibotari in 1628, he reported that the young chief of the Sahuaripa Opata, Gran Sisibotari, had been dead for several years; he apparently died at the height of the epidemic of 1623–25 (AGN 1628b:345).

The Ures, Batuco, and Sisibotari Opata were not the only groups beyond the mission frontier that suffered in 1623–25. In a report covering the years 1625 and 1626 (AGN 1626), Father Julio Pascual noted that around the first of the year, 1626, a delegation of Chinima traveled to San Felipe to ask for priests—"because many of them were dying" (AGN 1626:148). Like the Opata, the Chinima petitioned for priests and baptism for many years prior to this latest visit in 1626. These requests apparently followed exposure to disease and were answered with brief visits by priests who worked along the Río Mayo. The anna of 1621, for example, noted that many natives along the upper Río Mayo died within fifteen minutes, and others died in a day or two after
receiving the waters of baptism (AGN 1621:280). Apparently as a consequence of the spread of disease, a large group of Bacoita and Tehatas—neighbors of the Chimipa—left the Sierras to settle in the recently founded missions at Conicari and Tepahue (AGN 1621:280).

In Father Pascual's letter recounting his entrada to the Chimipa in March 1626, the priest noted only twenty children had survived out of the eighty that had previously been baptized by Father Miguel Godínez, apparently in 1621 (Dunne 1940:174). Pascual also reported that more than a third of the children who had been baptized by Father Julio Castini between 1620 and 1626 were dead (AGN 1626:148-49). Presumably the diseases that claimed these children also exacted a heavy toll among the Chimipa's neighbors. As early as 1620, the Varohías, Témoris, and Guazáparres had sent delegations to San Felipe to learn more about the Jesuits and missionization (AGN 1620; Pérez de Ribas 1944:1, 369-73, II, 10-54).

At approximately the same time Sinaloa suffered from smallpox and other maladies, the Acaxee and Xixine in the foothills and mountains about Topia and San Andrés also were afflicted with disease (Alegre 1958:353). Very little is actually known, however, about the epidemic's impact on the Acaxee and Xixine. The Jesuit provincial who prepared the annual reports for 1623 and 1624 noted that the local superiors of the San Andrés/Topia missions failed to send reports covering these years (AGN 1623:94; AGN 1624:123). However, in the annual report for 1623, the Jesuit provincial did note that he received a letter from a Jesuit who recently had been assigned to the Topia/San Andrés mission. In his letter, the new recruit, Bartolomé Soledado, mentioned several instances where Saint Ignatius miraculously interceded on behalf of natives who were sick with fevers and "back pains," or what may have been pneumonia (AGN 1623:94).

The Tepehuán and their northern neighbors, the Tarahumara, also may have suffered during the epidemic of 1623-25. Preoccupation with an epidemic may explain why local superiors of the Tepehuán mission failed to send an annual report to Mexico City for the years 1624 (AGN 1624:122) and 1625 (AGN 1625:137). Another reason for believing the Tepehuán and Tarahumara suffered in 1623-25 is the fact that their neighbors, the Laguneros of Parras, were devastated by disease during these years. The "anua" of 1623 states that smallpox, pneumonia ("back pains"), typhus, "sore throat," or what may have been influenza or a secondary infection like streptococcus, ravaged the Zacatecas and Iririlla. Never before had diseases so terrible and contagious been seen in the Laguna region (AGN 1623:90). The "anua" of 1624 (AGN 1624:122-23) indicates that the majority of the mission population of Parras as well as innumerable gentiles from the tierra adentro suffered from one or more diseases. Many who suffered must also have perished, as census data from 1625 (Hackert 1926:156-57) show the population of Parras numbered 1,569—less than 10 percent of the aboriginal population of the region (Pérez de Ribas 1944:III, 293).

At the same time the Laguneros were suffering, large numbers of blacks, mulattos, mestizos, and Indian mine workers died in Zacatecas from a variety of diseases (Tello 1891:779-80). The mission caravan that was assembled or passed through Zacatecas early in 1625 (Scholes 1930:94) may very well have brought the epidemic to New Mexico. Like their commercial counterparts, the mission canovas were escorted by a detachment of soldiers and consisted of thirty or more wagons, each of which carried close to 4,000 pounds of goods. A large herd of cattle, draft animals, and mules accompanied each caravan, as did settlers, traders, missionaries, and others bound for the north (Moorhead 1958:33).

Significantly, the contract for the mission caravan of 1625 indicates that 900 pesos were spent on medicines and drugs. This is a substantial amount, given that the entire cost of the caravan was a little over 18,000 pesos and covered everything from thirteen mules with saddles and bridles to two arrobas (twenty-three kilos) of capers (Hodge et al. 1945:109-24). The contract that was drawn up for the mission caravan of 1625 states that four dozen hens were sent northward with the supply train, "for those who may be sick during the journey" (Scholes 1930:102)—an indication of the apparent frequency with which people became ill while traveling to Santa Fe.

Conceivably, then, smallpox and other maladies that ravaged Zacatecas and other stops along the Camino Real accompanied the mission caravan in 1625. We know that between 1622 and 1641 the population of Pecos declined by 40 percent and that as many as half (forty-five) of the pueblos in the Río Grande Valley were abandoned between 1600 and 1643 (Kessell 1979:170; Schroeder 1972:53). Further, the Franciscan historian Vetancurt (1961:276) noted in his Chronica, which was completed in circa 1650, that the Hopi numbered more than 14,000 and that this number had been greatly reduced by disease prior to missionization. When missionaries arrived at Awatovi in 1629 there were five Hopi villages with a population of 3,000 (Adams 1981:324). That same year the Franciscans settled among the Zuni, among whom presumably Old World diseases also wreaked havoc. Although direct evidence is lacking, the Sobaipuri Pima of southern Arizona, who regularly visited Hawikuh and held
trade fairs with the Hopi, also may have been affected by the epidemic of 1623–25.

A Decade of Relative Calm, 1626 to 1636

The devastation wrought by the epidemic of 1623–25 contributed to a temporary slowing of mission expansion on both the western and eastern slopes of the Sierra Madre (Bannon 1953). Even before the epidemic began, the Jesuits had spread themselves thin. Between 1614 and 1626, over 83,000 natives were baptized in Sinaloa and Sonora (Duene 1940:218). Despite a fourfold increase in the size of the mission population, the number of priests in the west coast missions increased from thirteen in 1614 to only twenty-seven in 1626 (AGN 1626:140; Duene 1940:220). More priests were needed to ensure that those who had been baptized fully understood the rights and responsibilities associated with Christianity. The Jesuits also were keenly aware that many of their recent converts lost numerous friends and relatives during the epidemic of 1623–25. Experience had shown that epidemics often were catalysts for native revolts, which irrevocably damaged the mission system. This point was brought home in 1626, when a group of Néhóni destroyed several churches and wounded Father Bandeni (AGN 1626:150; 1626a).

Before the mission frontier could move forward, then, it was imperative that the Jesuits win over the hearts and minds of the many thousands that already had agreed to mission tutelage. During the decade following the epidemic of 1623–25, the Jesuits cemented themselves with the establishment of a handful of new missions. In 1626, Father Julio Pasqual began a permanent mission among the Chináp in and their neighbors, the Varohío and Guazápari (Bannon 1939; Pérez de Riba 1944:I, 365–73; II, 30–54). That same year, a permanent mission was founded among the Sisibotari Opatá (AGN 1628b). Two years later, permanent missions were begun among the Ayivino and Baruco (AGN 1630a; Alegre 1958:412–13; Bannon 1955; Pérez de Riba 1944:II, 164–85).

Although it is possible to follow in a general way the progress made by the Jesuits during the decade following the epidemic of 1623–25, there is a relative paucity of historical documents for this period (Bannon 1953). The available materials for the period are vague with respect to the frequency and character of disease episodes. The period from 1593 to 1626 was characterized by a major epidemic every five to eight years. If the pattern persisted, then there should have been a major epidemic between 1631 and 1634. The documents that are available for these years, however, do not mention epidemics of regional proportions. It is possible that, as a consequence of repeated exposure to disease, the mission population reached the point where it lacked a sufficiently large group of susceptibles to sustain such an epidemic. As noted, the mission frontier was largely stationary during the decade from 1626 to 1636. Thus, a relatively small number of converts—individuals with limited exposure to disease—were added to the mission population during this period. In fact, half as many natives were baptized during the decade that followed as compared with the decade that preceded the epidemic of 1623–25 (Duene 1940:218). From 1632 to 1637, 11,892 infants and 4,751 adults were baptized in the entire Rectorado of San Ignacio, which encompassed the newer missions among groups such as the Chináp, Sahaurápa, Baruco, Ayivino, and Utes (AGN 1637:274).

It is not altogether surprising, then, that the Jesuit missions of the north were spared the effects of a major epidemic between 1626 and 1636. Recall that a similar respite obtained in southern Mexico during the period from 1550 to 1575, following the dislocations of the initial conquest period. It should be noted that while there may not have been any major epidemics that swept through the missions during the period from 1626 to 1636, individual communities and mission districts did suffer from disease episodes. In 1630, for example, Father Nicolás de Estrada reported that the Jesuits worked day and night attending to many natives who suffered from various enfermedades in Cuencamé and other settlements on the eastern flank of the Sieras (AGN 1630a).

It is conceivable that these isolated outbreaks of disease, while they failed to reach epidemic proportions in missionized areas, spread beyond the mission frontier and had a profound impact. As we have seen, often the spread of disease beyond the mission frontier was coincident with pleas from gentle groups for priests and baptism. It is perhaps significant in this regard that Father Tomás Basilio reported in the annua of 1635 that many Opatá beyond the northernmost Baruco mission had petitioned for ministers and baptism. In what may be a veiled reference to an epidemic, Basilio further noted that there were "many souls, of whom so many are children and infants who are dying each day without baptism" (AGN 1635:263).

The spread of disease beyond the mission frontier in Sonora might also explain an entrada to the middle and upper Río Sonora Valley that was undertaken by Father Lorenzo de Cádiz in 1636—several years before the Jesuits received permission to establish missions in the area. Cádiz reportedly baptized many natives, including an indeterminate number of adults who presumably were in danger of dying (AGN
1646:401). Significantly, one Jesuit writing in 1638 further noted that Cárdenas collected the Opat in villages (Bannon 1955:66). Here, again, we have what appears to be evidence of the spread of disease beyond the mission frontier, as both the archaeological record and the exploration chronicles indicate that the Opat of the Sonora Valley were living in villages and towns as well as rancherías, aboriginally, that is, prior to around A.D. 1600.

The Epidemics of 1636 to 1641

The disease episode that apparently affected the Opat of central Sonora in circa 1636 was one of a number of disease episodes that abruptly terminated the previous decade of epidemiological quiescence. During the years from 1634 to 1636 many areas of central Mexico suffered from a *cocoliztli* that was characterized in part by malignant fevers (Alegre 1958:440-41; Zavala and Castelo 1945:VII, 67-68, 70-71, 80-81). The disease agents that were responsible for these “fevers” apparently spread northward to Zacatecas in 1636. That year, and for several years thereafter, disease wrought disaster among the native labor force. As evidence of a prior calm or quiescence, it is interesting to note that in 1637 the Cabildo of Zacatecas reappointed a city doctor, a post that had been allowed to lapse (Bakewell 1971:200).

At the time Zacatecas suffered, smallpox appeared several hundred miles to the northeast, in Monterey (Figure 23). There it raged for several years, killing large numbers of Indians (Del Hoyo 1972:413-14). In 1637 or 1638, smallpox may have accompanied one of the many mule and wagon trains that regularly brought silver, litharge, and lead from Monterey to Parral (De León 1909:85-86). In a letter written in August 1638, Father Gaspar de Contreras requested priests to establish a mission among the Tarahumara near Parral, of whom “countless” were dying from smallpox. Contreras, who was the local superior of the Tepehuan mission, learned of the epidemic from muleteers who returned to Parral after apparently visiting the Río Balleza, where they exchanged wool and other goods for maize (AGN 1638:286-287; Sheridan and Naylor 1979:11-13).

The smallpox epidemic that affected the Tarahumara apparently continued on and off for several years, infecting numerous Tarahumara, Tepehuan, Concho, and Toboso communities in southern Chihuahua (Alegre 1959:10; DHM 1645:130-43; Griffen 1979:5, 100). Jesuit reports indicate that about the same time, in 1639 and 1640, an epidemic occurred among the Opat of central Sonora. The epidemic was coinci-

Figure 23. Areas affected by disease between 1636 and 1641

dent with the founding of a permanent mission in the middle Sonora Valley, and lasted from November 1639 to the following April 1640. Though many natives reportedly died, the Jesuits also noted that many natives regained their health, some within two or three days after being baptized. The number of people who recovered was so great that the priests became concerned that the Opat were viewing baptism as a cure
Disease Episodes in Northwestern New Spain

for disease, rather than a spiritual cleansing of the soul. Although the
documentary sources do not indicate what maladies affected the
Opatas,
the fact that many natives weathered the epidemic suggests that the
Opatas previously had been exposed to Old World diseases (AGN 1639a;
Pérez de Ribas 1944:II, 188-91).

As often is the case, it is difficult to determine whether the epide-
mic that affected the Sonora Valley spread to other parts of Sonora
and Arizona (Figure 24). The Sonora Valley could have been the source
of a malady that afflicted the Cahuilla in 1641 (Alegre 1959:10). In the
report discussed above (AGN 1639a), the Jesuits noted that "gentiles
from many parts" attended religious celebrations in the Sonora Valley,
which apparently were held during Christmas and/or Lent of 1639 and
1640, when one or more maladies were current in the valley. We know
from Jesuit sources (e.g., AGN 1647a) as well as Obregón (Hammond
and Rey 1928:162-95) that the Opatas of the Sonora Valley were rela-
thed through marriage and participated in joint military ventures with Opatas
along the Río Moctezuma (Cumupas) and Río Bavispe (Guasavas). Con-
ceivably, representatives of each of these groups attended the celebra-
tions, together with Himeri and other Pima who traveled to the Sonora
Valley to trade (AGN 1678:257). If so, there is a good chance that some
celebrants returned home with infections. It is perhaps significant that
the annua from the new Mission of San Francisco Xavier for 1639 indi-
cated that a number of "gentile nations" who had sent representatives
to the Sonora Valley subsequently petitioned for priests and baptism
(AGN 1639a).

There is good reason to believe that smallpox and other maladies
that were current in northwestern Mexico between 1636 and 1641 were
carried northward along the Camino Real to New Mexico. In a report
that was written a month after Father Contreras wrote of smallpox among
the Tarahumara near Parral, Fray Juan de Prada, the Commissary
General and highest ranking Franciscan in New Spain, noted that he had
received reports from New Mexico that the Pueblo missions had declined
from 60,000 to around 40,000, because of "the very active prevalence
during these last years of smallpox and the sickness which the Mexicans
called 'coocolitzti'" (Hackett 1937:108). In 1640, 3,000 additional natives
in New Mexico perished during what was probably a resurgence of
smallpox and/or other maladies (Schoeder 1972:54).

Malicious Fevers of 1645-47

Although the Sonora and other Opatas groups had for many years
requested priests and baptism (e.g., AGN 1635:263), the decision by
the Jesuits in 1638 to establish a permanent mission in the Sonora
Valley was triggered by a "turf battle" with Captain Pedro de Perea.13
In 1637, Perea, who was the alcaldé mayor of Sinaloa, apparently
convinced the viceroy to divide Sinaloa into two provinces. The northern-
most province, Nueva Andalucía, included all lands to the north of the
Río Yaqui. Under the terms of a contract drawn up with the Crown,
Perea was appointed alcaldé mayor of Nueva Andalucía and was given
four years to establish mines, farms, and otherwise promote the de-
velopment of the region. When it became apparent to the Jesuits in 1638
that Perea was going through with his plans—plans that threatened
their long-standing commitment to missionize Sonora—the Jesuits moved
quickly into the Sonora Valley.

Perea, however, persisted and during the summer of 1645 he brought
four Franciscans and an unknown number of Spaniards from New Mexico,
assigning lands and converts along the upper Río Sonora, the Río San
Miguel, and the Río Bavispe. Perea also attempted to place a Franciscan
among the Himeri in and about Magdalena. The Himeri, perhaps for-
warned by the Jesuits, rebuked Perea, forcing the captain to retreat to
Toapa. While en route to Toapa, Perea became seriously ill and had to
be taken by stretcher to his home at Banamachi in the Sonora Valley.
There Perea briefly rebounded from his illness, only to suffer a relapse
that left him prostrated and delirious and which finally took his life on
October 4, 1645 (AHII 1666; Polzer 1972a).

It appears significant that at roughly the same time Perea became
ill, the Opatas of the Sonora Valley were afflicted by an unidentified
epidemic, which claimed an unspecified number of lives (AHII 1666;
Polzer 1972a:270). Conceivably, Perea harbored Plasmodium parasites,
which, before they claimed the captain's life, were spread to the Opatas
of the Sonora Valley during the late summer of 1645. As we have seen,
many Spaniards who came to northern New Spain, beginning with
Nuño de Guzmán and including priests like Gonzalo de Tapia and
Eusebio Kino, suffered from malaria or what was called tertianas (e.g.,
Alegre 1956:144, 152, 161; AGN 1653b:379; Burrus 1971:1569;
Carrera Stampf 1955:40; Niememberg 1889:408, 430; Tello 1891:46-47;
Treatlein 1949:213-14). We also have seen that the historical record
is replete with references to mosquitoes, including references to malaria
vectors such as Anopheles maculipennis freeborni (see Treatlein 1949:138
and compare with Ross and Roberts 1943; Russell et al. 1943:22).

13 The dispute that grew out of Perea's colonization scheme was the subject of a detailed
Relación (AHII 1666) that apparently was written by Father Felix Pantoja between 1666 and
1684 (Polzer 1972a:259). The Relación has been translated into English and discussed in detail
by Polzer (1972a). Additional information also can be found in Schoeder (1956).
It is quite possible, therefore, that Captain Perea harbored the *Plasmodium* responsible for the epidemic of 1645 in the Sonora Valley. Interestingly, the *anua* of 1648 and 1649 indicates that the Opata missions of central Sonora continued to suffer from an epidemic of "malignous fevers" (AGN 1649:97-98). In 1651, Father Manuel de Truxillo further noted that two of the Franciscans who accompanied Perea to Sonora died in 1648 (AGN 1651). The two Franciscans apparently had been working among the Opata of Teuricatzi and Básarac. While it is unclear whether these Opata suffered from malaria or "malignous fevers," some malady apparently afflicted neighboring groups such as the Guasabas Opata. In a letter recounting the founding of the first permanent Jesuit mission along the Río Bavispe, Father Marcos del Río commented that many of the 4,000 Guasabas who were baptized by the Jesuits in 1646 and 1647 recovered from some unspecified illness after being baptized or blessed by the priests. Del Río further noted that there were many others who "left this life for eternal happiness" (AGN 1647:31; 1647a).

The impression one gets from Del Río's comments is that the Guasabas were not afflicted with smallpox or some other easily recognizable disease; Del Río's vagueness points to a more insidious malady, like malaria. As noted, around the time of his entrada, the Opata of central Sonora suffered from malignant fevers. In 1646 or 1647, many Tarahumara and Tepehuan pueblos to the south also were afflicted with disease, as were the Xixime (Figure 25) (Aprece 1959:51-63; AGN 1647:32-34; 1647b; Pérez de Ribas 1896:1, 304). The *Carta Anua* for the following years (1648, 1649) gives several examples of people who suffered from disease, including a Tarahumara woman with "pernicious fevers," and another who "suffered from a very grave illness, and lost her speech" (AGN 1649:98). These symptoms are reminiscent of those exhibited by Captain Perea during his apparent bout with malaria in 1645. Whatever the malady, it wreaked havoc among the Tarahumara, particularly the mission of San Miguel de Bocas. The epidemic reportedly lasted for five months, and while many died, many natives also miraculously cured. Indeed, the *anua* implied that the epidemic was unusual, inasmuch as it was common for epidemics "to take entire villages to the grave" (AGN 1649:97-98).

The Epidemic of 1652-53

In 1648, a year after one or more maladies reached epidemic proportions in Nueva Vizcaya, four Tarahumara caciques and several hundred of their followers staged a short-lived rebellion (DHM 1651; Dunne 1948:46-58). Again in 1650 and 1652 the Tarahumara rebelled, once more suffering defeat at the hands of Spaniards and fellow natives (Dunne 1948:58-80). In a report dated June 29 (1652), Father Jose...
Pascual noted that at the end of the uprising the Tarahumara were decimated by a severe plague that lasted for two months and which left some rancherias without a single survivor. Pascual further noted that many Tarahumara, particularly the young people, were disfigured with scars (Alegre 1959:236; DHM 1651:205-7; Sheridan and Naylor 1979:28-29). Accounts of modern epidemics of smallpox as well as historical materials from the seventeenth and eighteenth centuries often mention or allude to smallpox victims who were disfigured with facial scars (Dixon 1962; Schroeder 1972:54; Treutlein 1949:163).

In 1652, smallpox and coccidiose reached epidemic proportions in the south, in the once populous Laguna region (Alegre 1959:236; Díaz Corone 1941:11, 33; DHM 1653:211; Pérez de Ribas 1896:II, 556). The following year, Sinaloa and Sonora also experienced an epidemic of smallpox and other maladies, which were accompanied by drought (Alegre 1959:236; AGN 1653a; 1653b; Pérez de Ribas 1896:II, 498). Apparently as a consequence of the spread of disease beyond the mission frontier, many Pima Bajo and Tarahumara gentiles in the mountains near Yécora fled their homes seeking baptism. The annual report of puntos from the mission of San Francisco Borja noted that two natives who had fled the lands of the Tarahumara died from disease eight days after they reached Onabas. These puntos also mentioned that there were more than 200 gentile families in the vicinity of Sahuaripa, apparently Jova Indians who were petitioning for priests and baptism (AGN 1653a).

The yearly report from the mission of San Francisco Xavier also indicates that Old World diseases outdistanced the mission frontier in northern Sonora. The report noted that a cruel epidemic of bloody stools, back pains, and sore throat raged in 1653 in the partido of Básarac, which included the Opati settlements of Básarac, Bavispe, and Guachinera as well as a Suma rancheria near Bavispe with 200 adults and children (AGN 1653a:137-38). The report also relates several instances of “divine intercession” involving children in the Pima mission of Ures who were suffering from what may have been dysentery. One child of fifteen months reportedly suffered for weeks with stomach pains, vomiting, and diarrhea (AGN 1653a:134). The puntos also indicate that the Jesuits’ recent converts in the Rio San Miguel Valley were afflicted with bloody stools, frequent problems with childbirth, and upper respiratory infections. Presumably, these maladies spread to the Rio Magdalena and throughout the Pimería Alta (Figure 26). At the time, many Hímeri who bordered the Opati on the northwest visited the Jesuits along the Rio Sonora and the Rio San Miguel, urgently petitioning for priests and baptism. In 1653 a “good number” of Hímeri had settled at Bacipsitzi and another 160 children and adults had been baptized and resettled in the San Miguel Valley (AGN 1653a:134-35). In the years following the epidemic of 1653, other Pima Alto and Seri beyond the mission frontier who feared for their lives traveled to the Sonora Valley to be baptized by the Jesuits (e.g., AGN 1678b).
who required instruction in Christianity. It was particularly important that the Jesuits intensify their indoctrination efforts among the rebellious Tarahumaras. The revolts in 1648 and 1650–52 threatened to spill over into Sonora, where recent epidemics left many natives with doubts about Christianity and the ability of the Black Robes to mediate the world of the supernatural. After 1653, then, the Jesuits once again sought to consolidate rather than expand their missionary activities.

The fact that the mission frontier began largely stationary did not, however, preclude outbreaks of disease. During the years 1655 to 1657, Sinaloa and Sonora suffered from serious famines (AGN 1655; 1656; 1657), lowering native resistance to acute and chronic infectious diseases. The annual report from the Mayo and Yaqui missions for 1656 noted that many natives died that year during an epidemic (AGN 1656a). The yearly report from the Nébome or Pima Bajo missions (DHM 1658) also indicated that during the past few years, and particularly in 1658, many Nébome converts suffered from one or more unspecified diseases. The nuna related how a priest in Onabas came to the aid of a Spaniard who was gravely ill with what appears to have been a respiratory infection. The nuna also noted that seventy adult gentiles from beyond the mission frontier in southwestern Chihuahua traveled to Onabas to be baptized. Several of these gentiles died, including an old man who was sick with a sore throat and fever. These various references to sore throats and fever are perhaps indicative of influenza, which may have originated in Nueva Galicia (Mota Padilla 1924:360).

More epidemics were reported during the 1660s (e.g., Alegre 1959:266–79, 291; Del Hoyo 1972:414; DHM 1662:217–18; 1668:224, 229; 1669:259) and, indeed, throughout the remainder of the seventeenth century (e.g., AHH 1684). Although with time, more and more groups acquired some resistance to maladies like smallpox, there still were occasions when major epidemics swept across northern New Spain. In 1692–93, smallpox, measles, and typhus raged in the west coast missions and destroyed more than a third of the population of Nueva Vizcaya (Hackett 1926:391, 453; Polzer 1972:183). The eighteenth century also witnessed epidemics that claimed many lives (e.g., AHH 1729; Treutlein 1949:219), although by the third quarter of the eighteenth century epidemics of smallpox were far less frequent (Nentvig 1980:25). Similarly, during the late 1700s measles appeared every ten or twelve years in Sonora—far less frequent than was the case 100 years earlier (Treutlein 1965:170). Although Old World diseases continued to exact a heavy toll well into the nineteenth century (Radding 1979:78–79), demographic data indicate most native populations largely were destroyed by 1678.

Figure 26. Areas of the Greater Southwest affected by disease by 1660

Still More Epidemics

Between 1639 and 1653, the Jesuits baptized tens of thousands of Opatas, Pimas, Spaniards, and Tarahumara. While many of these converts died during the disease episodes discussed above, still many others survived...
CHAPTER 4

THE DEMOGRAPHIC CONSEQUENCES OF OLD WORLD DISEASE

CALCULATING THE IMPACT OF DISEASE

The Jesuit materials and other sources make clear that epidemics of smallpox and other maladies were a regular feature of life in northwestern New Spain during the early historic period. The historical record is distinctly less helpful in terms of quantifying the demographic consequences of endemic and epidemic diseases. The Jesuits and other Spaniards only periodically reported the number of Indians who perished during disease epidemics. As we have seen, the missionaries frequently found it difficult or impossible to record all those who perished during epidemics. It also was common during epidemics for the Jesuits to visit gentile communities beyond the mission frontier where the priests baptized infants and adults whose death was not noted for many years, if at all (e.g., AGN 1626:148–49).

Under the terms of the Patronato Real, all communication between religious orders in Mexico and Rome was controlled by the Crown (Alvarado 1974). It may well be that the Jesuits consciously avoided detailing population reductions for fear that the Crown or Jesuit foes would accuse them of mistreating their neophytes. On several occasions during the seventeenth century regular clergy and civilians who coveted the Jesuits’ native following accused them of prospering at Indian expense (AGN 1637a; AHH 1638; Bannon 1955:108–17; Dunne 1948:81–87; Hackett 1937:94–127; Polzer 1972). We are somewhat fortunate in that these charges resulted in reports and testimony on the status of the missions. The documents, when supplemented with baptismal and other census reports, shed light on the demographic consequences of disease,
particularly after 1591. While far less satisfactory, the explorers' early observations regarding the size of native armies, settlements, or provinces can be compared with later observations to determine the extent of population decline prior to 1591.

The use of population figures or other demographic data reported by early European observers frequently has been questioned by researchers (see Borah 1976:15; Doby 1966:398; Kuhler 1948; Peterson 1975). Many believe the explorers and missionaries were prone to exaggerate or lie. Others have questioned whether clerics and other colonial officials employed sound bookkeeping practices and were capable of representative census taking (Cook and Simpson 1948:19; Johansson 1982). It has not been demonstrated, however, that Europeans were especially dishonest or incompetent during the sixteenth and seventeenth centuries. Today, as in the past, in addition to human error, there appears to be no shortage of officials who juggle or massage numbers to insure the continuation of vested interest groups. Even modern censuses, supervised by trained demographers and statisticians and compiled with high-speed computers, have been fraught with problems of representation and inaccuracy (Borah 1976:28).

The demographic data compiled by the Jesuits and other Spaniards—like any source of information—must be critically examined not only for truthfulness but also as cultural discourse. As noted, the Jesuits were well-educated men, bound by strict rules of obedience that were enforced by a militarylike command structure that discouraged distortion of facts and figures (Polzer 1976; Shiel 1934:87). Arguably, the Jesuits also had fewer reasons to lie or exaggerate. Unlike regular clergy, corregidores, or encomenderos whose income often was based on tributary counts (Cook 1981:88–89), each Jesuit missionary received a modest and fixed income from the Crown. This income did not vary with the number of natives a missionary baptized or ministered to (see Alegre 1959:353–58; Treutlein 1939).

Mission superiors also had little to gain from exaggerated reports of the size of the mission population or the number of natives baptized. It is significant in this regard to note that the Jesuits never were challenged with respect to how many Indians they baptized or had under their care (AHH 1638: 1657a; Hackett 1937:94 ff.). The number of Jesuit neophytes was well known by civil and military officials, who often worked closely with the Jesuits to expand the mission frontier (see Burrus 1971; Dunne 1940:48 ff.; McShane 1938; Pérez de Ribas 1944:1, 214 ff.). Indeed, it was this knowledge, which also was shared by Spanish miners and settlers, that got the Jesuits into trouble, for many civilians came to covet their large following and differential access to and control of native workers.

There is little reason to believe, then, that the Jesuit provincial or other superiors inflated reports of baptisms or the mission population. We are fortunate in any event that for each Jesuit report on baptisms or population there are numerous other documents that provide historical and contextual information to assess the accuracy of Jesuit censuses. When the Jesuit materials are cross-checked in this fashion it becomes apparent that the Jesuits generally were careful observers (Sauer 1935:2).

In keeping with the rules and precepts of the Jesuit Order, individual missionaries kept close tabs on not only their neophytes, but all mission property (Polzer 1976; 1972). The Black Robes prepared reports on everything from the number and types of cattle in a mission to the number and types of mission converts. Unfortunately, extant Jesuit documentation, while voluminous, does not cover all missions or time periods equally. In some instances the reports pertain to one mission community or a group of related communities (partido), while in other instances they cover a vectorado with a dozen or more partidos of the entire mission system. Also, while reports from individual missions or partidos give what at first glance appear to be total population figures (e.g., personas todas, todos los almas), the figures frequently do not include infants (ages four and under), presumably because this cohort was so unstable.

Most Jesuit reports dealing with the mission population enumerate one or more of the following: families (often married couples), unmarried adults, widows and widowers, confessants, children of doctrina (often broken up by sex), communicants, and/or births, deaths, and marriages. To make use of these disparate reports, it is necessary to convert data on family numbers, confessants, or other categories into total population. In his seminal analysis of the aboriginal population of northwestern Mexico, Sauer (1935) frequently converted Jesuit data by extrapolating from the 1920 Mexican census. For instance, Sauer often estimated the aboriginal population of an area by multiplying Jesuit family number counts by six. While a family of six may have been the norm in many areas, aboriginally, the family numbers enumerated by the Jesuits generally were compiled after groups had been repeatedly exposed to Old World diseases. Family size, birth and infant mortality rates, and the age/sex distribution of native communities were altered significantly following outbreaks of smallpox and other maladies. Because Sauer failed to consider these changes, even though he acknowledged the prevalence of disease, his population estimates often are inaccurate.
Since the use of colonial-period censuses and reports involves making assumptions and inferences that are potentially fallacious, I have outlined below the principal Jesuit and other colonial sources used in this analysis and how they have been interpreted.

**PRINCIPAL JESUIT AND OTHER COLONIAL CENSUSES**

*Catálogo de la gente que tienen los partidos de la Provincia de Cíhuatzingo, fecho en 12 de Henero de 1624 (AGN 1624a)*

The "Catalog of people in the mission districts of the Province of Cíhuatzingo. . ." is explicitly a population census covering the nineteen mission districts or *partido* that existed in 1624. The catalog, which is not signed, presumably was compiled by the superior of the Cíhuatzingo mission, who, in turn, relied on the annual reports that were submitted the previous spring (1623) by the dozen or so priests who were working in the west coast missions. The catalog would not, therefore, reflect the tremendous population losses sustained during the epidemic of 1623-25. Recall that Father Juan Lorenzo reported that more than 8,600 mission converts in the province of Cíhuatzingo perished during the epidemic.

The numbers enumerated for each *partido* in the catalog are consistent with the Jesuit *annua* and other primary sources, with the exception of the figure for the *partido* of Tecoripa. The catalog indicates that the *partido* had a population of 9,759. An error apparently was made, perhaps by a抄, since the *annua* of 1624 indicates that there were 2,750 Nébome in the *partido* of Tecoripa (Dunne 1940;217). Other primary sources also indicate there were between 2,000 and 3,000 neophytes in the *partido* (AGN 1622; Pennington 1983:32-33; Pérez de Ribas 1944:II, 162-69).

Curiously, while the *annua* of 1624 gives what appears to be an accurate figure for Tecoripa, the *annua* is in error with respect to the number of neophytes in the *partido* of Onabas—a mere 100. This figure cannot be correct, as Father Diego de Bandejaspe began baptizing the Nébome of Onabas as early as 1620 or 1621. Also, as figures from later years indicate, the Nébome of Onabas and Movas were far more numerous than their Nébome neighbors in the *partido* of Tecoripa. It is likely that the figure of 10,000 enumerated in the catalog of 1624 is more nearly correct, for about this time Father Oliñano had some 2,600 families under his care (Dunne 1940:201). One is left to wonder if the authors of the *annua* of 1624 and the catalog of 1624 both relied on the same poorly scripsec report from the Nébome missions, confusing 9,759 for 2,750, in cheese instance, and 100 for 10,000 in another.

It should be noted that not all of the 12,750 neophytes in the *partidos* of Onabas and Tecoripa were Pima Bajo. In 1623 Father Oliñano added the Cñite-speaking pueblo of Nure to the *partido* of Onabas. The *partido* of Tecoripa likewise included over 400 Eudeve-speaking Ayta of the Río Mátape who were baptized in 1622 by Fathers Oliñano and Basilio. Also, on at least one occasion Father Oliñano or another Jesuit visited the Siwabotari Opata of the Río Sahuaripa, apparently baptizing an indeterminate number of infants and children (AGN 1627; Bannion 1953:45).

It has been assumed that 11,750 neophytes in the *partidos* of Onabas and Tecoripa were Pima Bajo, and that the remaining 1,000 were Ayta and Siwabotari Opatá and Cñite-speakers in Nure. The total Christian population of the Cíhuatzingo missions in 1624, therefore, was closer to 77,000 rather than 84,000, which is the total given in the catalog.

Razon y minuta de los yndios que se administran en las provincias de Nueva Vizcaya . . . (Hackett 1926:152-59)

The "Account and memorandum of Indians administered in the provinces of Nueva Vizcaya. . ." was compiled in 1625 by the governor of Nueva Vizcaya in response to a royal *cedula*. The Jesuits as well as the Franciscans and other clerics provided the governor with the names of the priest(s) and the number of baptized Indians in each mission, convert, or settlement under their care. Mission communities on both the western and eastern slopes of the Great Divide as well as in the heart of the Sierras among the Tehuán, Xixime, Acaxee, and Tzahumara are represented in the *Razon y minuta*.

The figures enumerated for the west coast missions generally correspond with those in the catalog of 1624. In a few instances the numbers from the *Razon y minuta* are greater than in the catalog. This difference may be explained by the availability, or the lack thereof, of updated reports on baptisms, as the *Razon y minuta* was compiled a year or so after the catalog of 1624. The *Razon y minuta* follows the catalog of 1624 in listing 9,759 natives for the *partido* of Tecoripa. As noted above, it is more likely that Tecoripa had only 2,750 neophytes in 1624.
Fragmental History (Sauer 1935)

In his analysis of the aboriginal population of northwestern Mexico, Sauer (1935) copied a passage from an unpublished "fragmental history," the original of which appears in volume 25 of Misiones in the Archivo General de la Nación in Mexico City. The passage Sauer copied from the fragmental history, which apparently was written by Pérez de Ribas (Dunne 1944:226), gives the number of pueblos and male heads of household (tecmos) for each river valley in northern Sinaloa and southern Sonora. Internal evidence, specifically comments regarding the extension of the mission frontier as far north as the "Sonoras and Huris," suggests that the figures on pueblos and tecmos were based on reports from 1637. This was a year after a permanent mission was founded at Ures and about the time that Father Lorenzo Cárdenas initiated baptisms among the Opata of the middle and upper Río Sonora Valley.

All totaled, there were 18,350 male heads of household in Sinaloa and southern Sonora in 1637. We can approximate the size of these households and the total population for each river valley using another Jesuit document from 1638. In this response to a royal cedula, the Jesuits reported that they were ministering to over 90,000 natives in the province of Sinaloa (AHH 1638; Hackett 1937:97). Simple arithmetic suggests then that the 18,350 households reported in the fragmental history averaged 4.9 members.

At first glance this figure appears somewhat large, particularly as there is abundant evidence that many groups sustained dramatic population losses between 1593 and 1638. An average household size of 4.9 undoubtedly reflects, in part, the amalgamation of families following the highly destructive epidemic of 1623-25. Presumably many adults assumed responsibility for widowed parents, brothers and sisters, and children of siblings or cousins who perished during the epidemic. Another and perhaps more important reason for a household size of 4.9 is that the decade following the epidemic of 1623-25 appears to have been one of relative quiet, epidemiologically speaking. As previously noted, there was a similar period of mostly minor disease episodes in central Mexico between 1560 and 1575 which enabled some populations to recover, albeit momentarily, from the tremendous losses of the initial conquest period.

It should be emphasized that a household size of 4.9 does not necessarily imply numerical recovery or even population maintenance. Jesuit reports indicate that many households that had two and perhaps three children lost one or two children during the new wave of epidemics that began after 1636.

Catálogo de la gente de confesión que se halla en estas provincias de 1636 (AGN 1656)

This catalog from 1636 covers only the west coast missions and is explicitly a census of "people of confession," apparently males fifteen and over and females thirteen or older (Cook and Simpson 1948:12). This inference is supported by later Jesuit reports (e.g., AGN 1678b; AHU 1684) that distinguish confessants from "children of doctrina," that is, boys aged five to fourteen and girls aged five to twelve.

Because populations age over time with repeated exposure to introduced diseases (Wrigley 1969:26-28), groups such as the Guasave and Cahuila of the Río Sinaloa, who were exposed to smallpox and other maladies at an early date, should have had a smaller percentage of children in 1656 as compared with groups such as the Yaqui. The latter, in turn, would be expected to have a smaller percentage of children than the Opata of central and northern Sonora, who were first exposed to disease a decade or more after the Yaqui. This line of reasoning is borne out by several reports that provide total population figures for the Yaqui and Opata and which enable us to calculate the percentage of each population under thirteen and fifteen years of age.

Specifically, it was noted in a report from 1657 (AGN 1657a) that the Jesuits distributed 6,000 daily food rations during a famine in the Yaqui missions of Rahum and Pótam. Presumably, the figure of 6,000 pertains to children and adults, but not infants. If we assume that infants, four and under, represented roughly 10 percent of the population, which is a figure suggested by a Jesuit report from 1678 (see the discussion of Zapata's report below), the total population of Rahum and Pótam in 1656 would have been 6,600. The catálogo for that year indicates the two missions had 4,326 confessants. Simple arithmetic suggests, therefore, that confessants were approximately 66 percent of the total population; infants and children of doctrina represented 34 percent of the total population.

Employing a similar procedure, the yearly report from 1653 for the rectorate of San Francisco Xavier states that there were more than 25,000 Christian adults and infants in the largely Opata missions of central and northern Sonora (AGN 1653a:134). Although at least several thousand infants and adults perished from 1653 to 1656 when Sonora was ravaged
by measles and other maladies, the losses probably were offset by the expansion of the rectorate and the founding of missions along the Río Fronteras at Cuquirachi, Teuricaúi, Cuchura, and Tibideguachi. In 1656, the missions of San Francisco Xavier probably had close to 25,000 converts. Inasmuch as the catalog compiled that year indicates the missions had 15,553 confessants, confessants constituted approximately 62 percent of the total population. It is significant to note here that a later report that gives both total population and number of confessants in the three Opatas missions of the partido of Huipec (AGN 1678b) shows that the percentage of confessants increased from an average of 62 percent in 1656, to 66 percent in 1678 (AGN 1678b), thus affirming the premise that populations repeatedly exposed to disease over time.

To arrive at total population figures, the number of confessants listed for each Yaqui mission in the catalog of 1656 was divided by 66 percent, while the number of confessants given for the Opatas of central and northern Sonora was divided by 62 percent. For all other groups listed in the catalog the average of the two figures for the Yaqui and Opatas, 64 percent, was used. Although the use of this average percentage obscures some differences among populations, it would be far more difficult and inexact to try to determine precise percentages for each mission population.

**Catálogo de todas las misiones de la Provincia de Nueva España de la Compañía de Jesús, año de 1662**
(Alegre 1959:353–58)

The catalog of 1662 is a rather detailed report on all the Jesuit missions of northern New Spain. The report was compiled by Father Hernando de Cabrero, who held the office of visitor general from 1661 to 1664. The catalog provides for each mission the name of the local superior, the number of pueblos and distance from each, the number of "souls" (often rounded off to the nearest whole digit), the language(s) spoken by the natives, the amount received from the Crown for support of the mission, and the amount spent annually for the education of the children in the mission. Although Burrus and Zubillaga (Alegre 1959:353n8) have suggested that the "souls" enumerated for each mission correspond to total population, the term "almas" may be a shorthand version of another term frequently used by the Jesuits: "almas capaces de administración"—souls qualified to receive the Holy Sacrament. The term "souls," if used in this sense, at a minimum would not include infants and children.

If one follows Burrus and Zubillaga and assumes that the catalog did in fact report total population, then one must conclude that many missions in Sinaloa and Sonora lost upwards of half or more of their population between 1656 and 1662. This simply is not indicated by the Jesuit anuas, which, while they do refer to famine and epidemics, do not mention or allude to the profound losses implied by Cabrero’s figures.

Because of the uncertainty surrounding the population figures in the catalog of 1662, I have used the report in only a few instances, principally for serrano groups who were not covered in the catalog of confessants in 1656 (see Table 1).

**Relación de las Missiones que la compañía tiene en el Reyno y Provincias de la Nueva Viscaya... echa el año de 1678... (AGN 1678; DHM 1678)**

In 1678 the Jesuit provincial instructed Father Juan Ortiz Zapata to conduct a visitation of the Jesuit missions of northern New Spain. Zapata’s inspection resulted in a detailed report on the number of families and the total population of each mission in northwestern Mexico. Zapata also commented on the languages that were spoken by various groups as well as native acceptance of Spanish and mission ways of life.

Although Zapata’s report is one of the most comprehensive reports compiled by a Jesuit visitor, a comparison of Zapata’s report and contemporary reports from the local superiors of the Opatas partidos of Huipec and Oposura (AGN 1678a; 1678b) reveal significant discrepancies. Zapata’s family number count for the pueblo of Oposura is 7.3 percent lower than what the local superior reported. More disturbing is the fact that Zapata’s family number counts for the remaining four pueblos in the two partidos are 28 to 45 percent higher than those reported by the local mission superiors, Fathers Martínez and Muñoz de Burgos.³

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¹ The report indicated that in Huipec confessants were 62 percent of the population. In Sonoquие confessants were 67 percent of the population, and in Badianki confessants were 68 percent of the population (AGN 1678b).
² Zapata reported that Badianki in 1678 had 128 families, Sonoquie 130, Huipec 120, Oposura 257, and Carruapan 307. That same year, Father Muñoz de Burgos reported that Badianki had 71 families, Sonoquie 74, and Huipec 60, while Father Martínez reported...
Discrepancies also become apparent when one compares Zapata's total population figures for the three missions in the partido of Huépac and the number of "souls" (not counting infants) reported by Father Muñoz de Burgos, the superior of the partido. In the case of Huépac itself, Zapata followed Muñoz de Burgos and reported 268 souls, even though Muñoz de Burgos clearly did not include infants in this figure. Zapata's total population figures for Barámaca and Sonoquepe differ from the number of souls reported by Muñoz de Burgos by 9 and 12 percent, respectively. In these two instances, Zapata clearly counted infants, whereas Muñoz de Burgos did not.

It is difficult to explain the above discrepancy in family numbers and the apparent failure on the part of Zapata to consistently include infants in his total population figures. It should be noted that Zapata's report evidences at least two different handwriting styles, and a shift in style occurs where the partido of Huépac (Guepata) is first discussed. It is conceivable that errors were made during the dictation or transcription of the report. While one might be tempted to dismiss Zapata's report, the document covers an important period and in many respects is thoroughgoing and insightful. It also is the case that Zapata's population figures square with the depopulation trends indicated by earlier and later reports.

Memorias and Informes Covering the Period from 1716 to 1720 (Alegre 1960:491-518)

The various catalogs and reports compiled by Cabrero, Zapata, and other Jesuit superiors often were based on reports transmitted by the superiors of individual missions or partidos. Many of these lesser reports or memorias are preserved in archives such as the Archivo General and the Archivo Historico de Hacienda in Mexico City. The reports cover a wide range of subjects such as the extent of mission property (e.g., furniture, crucifixes, statues) and the number and types of cattle that Opopora had 256 vecinos and Cunnopa 184 (AGN 1678a, AGN 1678b). Zapata's family number for Huépac (130) is more than twice that reported by Father Muñoz de Burgos (60).

Zapata gave total population figures of 357 and 358 for Sonoquepe and Barámaca, respectively, whereas Muñoz de Burgos reported 321 and 307 "souls". Father Martin de Burgos did not give total population figures in his report for Opopora and Cunnopa.

It is possible that Zapata's family numbers generally are larger because he included families headed by widows and widowers, while the local superiors did not. In the case of Opopora, Zapata may not have counted families in several nearby rancherias that appeared around this time in association with Spanish mining activity at Guadalupe (see Roca 1967:190 ff.).

The household average of 4.2 that was suggested by reports from the twelve Opata missions of Sonora was used to calculate the total population of those missions in 1720 that reported family numbers, but which omitted or failed to adequately distinguish total population. Again, the use of an average figure obscures the differences among mission populations. The differences are not so great, however, as to obscure general population trends.

Estado de la Provincia de Sonora (DHM 1730)

This report on the missions in the province of Sonora, which at the time encompassed southern Arizona as well as present-day Sonora, was written by an anonymous Jesuit in 1730. The Estado provides valuable information on native languages and the process of acculturation as well as data on number of families, children of doctrine, single people, belonged to a given mission. Of significance here are reports that detail the number of families and types of individuals in a mission community and the number of baptisms, marriages, and burials that occurred during specified periods. These demographic reports are valuable in their own right and also provide a check on the accuracy of general reports or censuses, as demonstrated above in the discussion of Zapata's general report from 1678.

In volume four of his Historia, Alegre (1960:491-519) copied numerous reports from individual missions that provide demographic data for the years 1716 to 1720. The reports, which were written by different missionaries, are not strictly comparable and infrequently give total population figures. They are consistent, however, in reporting "families," or what is perhaps better understood as households with a married couple. Reports from twelve different missions that give both family numbers and total population, including infants, indicate that family or household size in Sonora in 1720 varied considerably, ranging from 3.8 members to 6.6, with the average being 4.2 (Alegre 1960:491-518). Differences in household size at this time were a reflection, in part, of differential mortality during an epidemic of smallpox in 1716-17 (e.g., Alegre 1960:504, 516). Figures supplied by the Jesuits, which are examined in greater detail later in the chapter, indicate that the infant mortality rate during and immediately following the epidemic (1716-20) ranged from a low of around 12 percent to a high of almost 60 percent at the mission of Bavispe. The latter mission had an average household size of 3.9 following the epidemic.

The household average of 4.2 that was suggested by reports from the twelve Opata missions of Sonora was used to calculate the total population of those missions in 1720 that reported family numbers, but which omitted or failed to adequately distinguish total population. Again, the use of an average figure obscures some differences among mission populations. The differences are not so great, however, as to obscure general population trends.
baptisms, marriages, and deaths. Unfortunately, only occasionally does it give what appear to be total population figures. From a comparison of the number of families, single people, children of doctrine, and the number of baptisms reported for each community, it is apparent that household size and composition varied considerably, as it did a decade earlier in 1720.

In communities such as Aconchi and Onabas, for instance, each family or married couple averaged 1.6 children of doctrine (aged five to thirteen/fifteen), whereas in communities such as Báserac and Ures each family averaged 0.9 and 0.6 children of doctrine, respectively. The figures for single people suggest that a third of the households in Aconchi and more than half the households in Onabas had an unmarried adult; in Ures and Báserac roughly a quarter of the households had unmarried or widowed adults.

Figures on baptisms given in the Estado also indicate significant differences in birthrates, which necessarily affected family or household size. A child was born in over half the families in Ures in 1729; in size, Aconchi almost a third of the married women gave birth to a child that year.

Differences in household size and composition in 1730 were a reflection, in part, of differential infant and child mortality during a measles epidemic in 1728, two years before the Estado was compiled (AHH 1729). Neither the Estado nor contemporary reports, however, provide sufficient or appropriate data to determine precisely how many infants, children, or adults perished in each mission community, thus affecting household size. In the absence of such information or total population figures from 1730, the number of families reported for each community in the Estado have been multiplied by 4.0. This is a smaller average figure than the 4.2 suggested by reports from 1720 and reflects additional losses during the measles epidemic of 1728.

The Visitas of Bishop Tamarón y Romeral and Father Manuel Aguirre (AHH 1764; Tamarón y Romeral 1937)

In 1759, the recently appointed bishop of the diocese of Durango, Pedro Tamarón y Romeral, made the first of several tours of his new bishopric, which included the Jesuit missions of northern New Spain. In 1765 the bishop compiled a lengthy report summarizing his findings and detailing the number of families and inhabitants in each of the Jesuit missions he visited (Tamarón y Romeral 1937). About the same time that Bishop Tamarón y Romeral drafted his report, Jesuit superiors instructed Father Manuel Aguirre to conduct his own inspection of the missions of northern New Spain (AHH 1764). Importantly, a comparison of the two reports shows that the bishop’s figures are almost always significantly higher than those of Aguirre. The discrepancy between the two reports may reflect the outcomes of an epidemic in 1764 (Nentwig 1980:xxiv; Treutlein 1949:217–18), occurring after the bishop’s inspection and around the time of Aguirre’s report.

Unfortunately, while Aguirre included what at first glance appear to be total population figures (individuos por todo), the totals do not agree with the number of confessants, doctrineros, and other subgroups enumerated for each mission in his report. For example, Aguirre reported that the Pima Bajo mission of Mocas had thirty-two families with sixty-four confessants, twelve communicants, fifty-six children of doctrine, and a “total population” of ninety! Because it is unclear who is included in Aguirre’s total population figures, Bishop Tamarón y Romeral’s report has been used extensively to calculate the mission population just prior to the Jesuit expulsion from the Americas. In a few instances Aguirre’s family numbers have been converted to total population by multiplying each by 3.2. This figure is an average that was computed from the family number and total population figures that were supplied by Bishop Tamarón y Romeral for 111 mission communities in northern Sinaloa and Sonora. Because the Jesuit mission system was disintegrating at this time (see Pennington 1980:79 ff.; Raddig 1979) and large numbers of adult males were working away from the missions, the figure of 3.2 should be seen as a conservative estimate of household size.
DEPOPULATION TRENDS IN NUEVA GALICIA AND THE MINING FRONTIER, 1530 TO 1590

The Tahue and Totorame

The documents discussed above are particularly useful for clarifying population trends during the mission period. They shed little light, however, on the earliest and some of the most severe population losses that occurred prior to 1591 in Nayarit and Sinaloa (Figure 27). As discussed in chapter 2, there is good reason to believe there were several hundred thousand Totorame and Tahue at the time of Guzmán’s conquest of Nueva Galicia (1530). Early historians such as Beaumont and Mota Padilla believed the Totorame, Tahue, and other groups in Nueva Galicia were reduced by half within a decade of Guzmán’s conquest, and by 1590, the native population had been reduced by 90 percent or more (Bancroft 1886:552-53; Gerhard 1982:48ff., 256ff.).

A decline of this magnitude, from around 500,000 to 50,000, accords well with Arregui's (1946:29) comments from the early seventeenth century that suggest that the entire population of Nueva Galicia numbered around 40,000 in 1610. Arregui reported that some 2,500 tributaría perished in Nueva Galicia between 1610 and 1621 and that another four natives perished for each tributaría who died. Arregui believed that Nueva Galicia as a whole lost 26 percent of its population during the period from 1610 to 1621, primarily as a result of disease. Figures compiled in 1671 by the alcalde mayor of Sinaloa show that the aboriginal population of Nueva Galicia continued to decline during the second and third quarters of the seventeenth century (Navarro García 1967:56-58).

The precipitous decline in the overall population of Nueva Galicia is reflected in figures for particular groups such as the Tahue of the province of Culiacán. The First Anonymous Reporter commented that the Culiacán River Valley in 1531 was one of the most densely populated areas in all the Indies. Reportedly, both banks of the river below the junction of the Río Humaya were lined for a distance of nine leagues (thirty-seven kilometers) with pueblos, spaced at a distance of half to three quarters of a league, and each with 500 to 600 houses (Icabalceta 1866:391). According to Sauer (1935:8), this description of Tahue settlement patterns is consistent with extensive archaeological remains found along the Río Culiacán. Sauer, nevertheless, concluded that the lower Río Culiacán had an aboriginal population of only 35,000. The First Anonymous Reporter’s statement, however, suggests there was a mini-

Figure 27. Population trends in Nueva Galicia

Figure 27. Population trends in Nueva Galicia

mum of twenty-four villages along both banks of the lower Río Culiacán, each with an average of 550 houses, and, assuming a household size of five, a total population of 66,000.

In 1596, the Jesuits reported there were upwards of thirty-five Christian villages along the Río Culiacán, the majority of which were Tepapa settlements above rather than below the junction of the Río Humaya (AGN 1596:67). The number of pueblos along the entire Río Culiacán further declined following the epidemic of 1601-02, which is known to
have affected at least twenty communities. Between 1601 and 1604, Bishop Mota y Escobar conducted a visita or inspection of Nueva Galicia, Nueva Vizcaya, and Nueva León and reported that the largest pueblo in the “once famous” province of the Tahues had less than forty vecinos. Figures supplied by the bishop indicate there were only ten pueblos along the lower Río Culuián, averaging twelve to fifteen vecinos or male heads of household. Above the villa of Cinaloa, there were another fourteen pueblos with 294 vecinos (Mota y Escobar 1940:105, 112–16).

According to Arregui, in 1625 there were 1,135 Indian tributaries in the entire province of Culuián, including 350 Pacaje who resided between the Río Piñafla and the Río Culuián; 350 Tahues who lived along the lower Río Culuián, from the villa as far as the sea; and 256 Tebacacs who lived above the Río Humaya. If we generously assume that these tributarios, aged fifteen to fifty, constituted a quarter of the entire population, then the Tahue may have numbered close to 5,000 in 1625. Figures from 1671 show the number of tributarios declined by 75 percent between 1625 and 1671, from 1,135 to 336. Presumably there was a corresponding decline in the total population, leaving but 1,250 Tahue in 1671. This inference is supported by evidence that more than nineteenth pueblos between the Río Piñafla and Río Culuián were abandoned between 1625 and 1671. Another fifteen pueblos along the lower Río Culuián and ten in the foothills also were abandoned during this period (Navarro García 1967:56–58).

The province of Chameela is another locale for which we have some time-series data. In 1531, Guzmán and his army were welcomed at the town of Chameela by the local cacique and 5,000 warriors. The warriors presumably included all able-bodied men between the ages of sixteen and fifty. If this assumption is valid and we further assume that aborigina the Chameelans did not differ greatly in terms of their age/sex distribution from the modern (1930) population of Mexico (see Cook and Simpson 1948:25–26; Sauer 1935:6, 10). Diego Ramírez, who conducted a visita of Nueva Galicia in 1531, warned that the few natives who remained in the province would soon be consumed if the “intolerable tribute” levied on them, slave raiding, and other abuses by Spaniards did not cease. Ramírez went on to note that because of these abuses many Indians no longer wished to have children (Paso y Troncoso 1939:37–41). Still others like Bishop Mota y Escobar noted that it was very common for natives to leave their villages to work on Spanish farms, ranches, mines, and to serve as burden carriers.

There can be no doubt that each of these nondisease factors contributed significantly to population reductions in Nueva Galicia. Guzmán’s conquest and the Mixton War may very well have claimed tens of thousands of lives. However, there is no reason, excepting the introduction of chronic infectious diseases, why the Totorame, Tahue, and other populations could not have recovered following the Mixton War. History is filled with examples of populations that quickly rebounded following wars and other calamities. As we have seen, most Totorame and Tahue communities were rid of Spaniards following the Mixton War and the
opening of mines in and around Zacatecas. Similarly, while slave raiding continued throughout the sixteenth and seventeenth centuries, there is little evidence to suggest that it occurred on a massive scale, that is, that tens of thousands of natives were exported from northern Nayarit and Sinaloa. Finally, while emigration for employment and an unwillingness to have children, coupled perhaps with infanticide, undoubtedly helped to depopulate many communities, the losses were of such a magnitude as to require further explanation.

In point of fact, the accelerated destruction of the Tahuantepec cannot be explained fully without reference to Old World diseases, particularly malaria, typhoid, and dysentery. All three maladies became endemic or semiepidemic along both the Gulf and Pacific coasts of southern Mexico and Central America during the decades following Cortés's conquest. By circa 1580, malaria and intestinal diseases wiped out 90 percent of the coastal population of Yucatán (Thompson 1970:57). In their analysis of population trends in central Mexico, Cook and Borah (1960:52) noted that the rate of population decline in lowland areas, including coastal Nayarit, Jalisco, Colima, and Sinaloa, was almost twice that of highland areas. As early as 1550 the aboriginal population of coastal Colima was reduced by 80 percent or more (Sauer 1948:81).

As we have seen, malaria, typhoid, and/or dysentery apparently were unleashed during Guzmán's conquest and subsequently became endemic or semiepidemic in coastal Nayarit and Sinaloa. As late as 1600, Bishop Mota y Escobar noted that epidemics were continually depopulating villages in Nueva Galicia (Mota y Escobar 1940:34–35). That many of these epidemics involved malaria and intestinal diseases is reflected in the bishop's many comments about the unhealthiness of Nueva Galicia. The bishop, on at least several occasions, referred to the Pacific coastal region as an unhealthy place where the native population had been “consumed” (Mota y Escobar 1940:63–64, 66–67, 86, 89–91). Settlements such as Chiameta were described as “mucho caliente y enfermo.” Reportedly, the most common illness in Guadalajara and its environs was tertianas, “the physicians called doubles” (Mota y Escobar 1940:50). Mota y Escobar clearly was referring to quartan malaria, which apparently was introduced by Nuño de Guzmán. The disease reportedly produced terrible fevers and chills, although “nobody died.” The bishop probably was alluding here to the fact that many adults were chronic sufferers of malaria and occasionally suffered a resurgence of parasitemia. This is often the case in areas where malaria is endemic and where infants and children are at greatest risk (Boyd 1949:567).

Fifteen years after Mota y Escobar wrote, Domingo Lazaro Arregui also alluded to what appears to have been malaria and/or intestinal dis-

eases. Specifically, Arregui observed that, by 1621, it was primarily children who suffered and died during disease epidemics, particularly “a type of very strong fever, accompanied by stomach pains and bleeding,” which often claimed its victims in eight days and in some cases only two or three days (Arregui 1621:26). Arregui went on to note that in times of general health young children often died without any real signs of illness, except for a brief coughing spell that brought forth blood. As late as the twentieth century, malaria and intestinal diseases remained a major cause of death in coastal Nayarit and Sinaloa (Faust 1949).

Population Decline and the Mining Frontier

The rapid expansion of the Spanish mining frontier during the third quarter of the sixteenth century, much like Guzmán’s conquest of Nueva Galicia, hastened native population collapse in Zacatecas, Durango, and southern Chihuahua. The advancing mining frontier brought many Tepehuan, Zacateco, and other groups in the Sierras and along the Mesa Central into sustained contact with Spanish colonists and Indians from Mesoamerica. This contact necessarily involved the transmission of Old World diseases. It, nevertheless, is difficult to estimate the demographic consequences of pre-Jesuit disease epidemics. Despite an early and sustained presence in the Sierras, the Franciscans apparently failed to produce or preserve records on their early efforts among the Zacateco (López-Velarde 1964:49). Determining native population trends during the period from 1550 to 1590 is also made difficult by the fact that thousands of free Indians from central Mexico flocked to the mining frontier for employment, often residing with and/or intermarrying with local native women (Mota y Escobar 1940:178; AGN 1678). Figures from 1581 show there were some 6,000 blacks and Indians working in the mines of Nueva Vizcaya (Paso y Troncoso 1940:5, 53). There also was considerable shifting of residence within the province. As ore deposits were discovered, worked, and frequently exhausted, the native population rose and fell in accordance with demands for labor and related services.

We may never know precisely how many Zacateco, Tepehuan, and other serranos natives died from Old World diseases between 1530 and 1590. That large numbers perished is nevertheless implied by a comparison of early observations by explorers such as Ibarra and those of later observers such as Bishop Mota y Escobar.

During one of the first Spanish entradas beyond Zacatecas in 1554, Francisco de Ibarra traveled to the Río Nieves, following the river north for some seventy kilometers before turning west to Ávila, San Lucas,
and Guatimaca, and then returning to Zacatecas via the Guadiana Valley. During this exploratory trip Ibarra and his followers reportedly visited or saw a large number of Zacateco rancherías. At one settlement along the Río Nieves, San Miguel, the Spaniards were greeted by 400 or 500 warriors. Other settlements like El Baptismo and Avino had several hundred residents. Pueblos of similar size also were found in the Guadiana and San Juan valleys (Mecham 1927:61-70).

During the decade following Ibarra’s entrada, the Franciscans retraced his steps, establishing permanent missions and baptizing at least several thousand natives at Nombre de Dios, San Juan del Río, and in the Guadiana Valley (Arlegui 1851; López-Velarde 1964; Mecham 1927:76). The fate of these converts and thousands of other natives who were baptized prior to 1600 remains unknown. It was probably clear from Mota y Escobar’s report that many who accepted baptism and employment in Spanish mines and ranches soon perished. Mota y Escobar noted that Nueva Vizcaya, in general, was thinly populated, lacking indigenous pueblos of significant size (Mota y Escobar 1940:189). The bishop noted that the region immediately north of Zacatecas was “for many leagues” totally depopulated. In the Valley of San Juan, which as late as 1575 had one pueblo with 3,000 Christian natives (Mecham 1927:231), Mota y Escobar found scarcely thirty natives. Other pueblos such as Cacarca, which in 1575 had 200 inhabitants, and Saucede, which had 1,000, remained by 1604 to ten Chichimec households and a total of thirty or forty individuals, respectively. The bishop also reported that the region about Durango was largely uninhabited. It is further apparent from the bishop’s comments that the Valley of Suchil, the Guadiana Valley, and the region about Nombre de Dios all had been largely depopulated—the native population having been replaced by cattle. Similarly, by 1600 the once populous Guatimaca Valley (see Hammond and Rey 1928:54-57) had been largely or wholly depopulated (Mota y Escobar 1940:68, 160, 197, 201).

Mota y Escobar’s report clearly suggests that the Zacateco largely were destroyed between 1550 and 1600, sustaining population reductions of 90 percent or more. The Tepehuan, Acass, Xixim, and Ixirilla also suffered during this period, particularly those natives who lived in and around the mines of Topia, Indé, and Santa Bárbara, and at Parnas and other points near or along the camino real of the interior. Although data are lacking to make a precise determination, the Acass, Xixim, Ixirilla, and Tepehuan all may have lost a third of their population prior to 1590. Reductions of this magnitude are suggested by epidemiological studies of virgin populations exposed to smallpox and other Old World pathogens (Ashburn 1947; Dixon 1962; Shurkin 1979). There is also evidence to be discussed shortly that indicates that native populations along the Pacific slope of the Sierra Madre generally lost between one third and one half their population prior to missionization.

POPULATION DECLINE DURING THE MISSION PERIOD, 1591 TO 1763

The Mission Population as a Whole

There are a number of statistics that were compiled by the Jesuits during their tenure in northwestern New Spain that provide a summary view of the rate and extent of population decline during the period from 1591 to 1677 (Figure 28). In 1638, the Jesuits reported that approximately 100,000 Ixtlilxóchitl, Tepehuan, Acass, and Xixim had been baptized, yet only 10 percent of those baptized were still alive (AHM 1638; Hackett 1937:100). Actually, the Razón y minuta indicates that as early as 1625 the mission population in the Sierras and along the eastern slopes of the Great Divide had lost to around 10,000. Apparently, the population of many serrano communities increased only slightly or remained stable during the epidemiologically quiescent period from 1626 to 1636.

A comparison of baptismal and census figures from the west coast missions shows a similar, although retarded, trend, reflecting the relatively late appearance of disease in northern Sinola. In 1638 the Jesuits reported that 200,000 natives had been baptized in the west coast missions (AHM 1638; Hackett 1937:100). Approximately half these baptisms occurred between 1620 and 1638, and yet the mission population totaled around 90,000 in 1638 (AHM 1638; AGN 1620; Hackett 1937:97, 100).

After 1636, when a new wave of epidemics began in northern New Spain, many more natives were baptized and perished. Figures provided by Pérez de Ribas (1896:II, 488, 562; 1944:II, 222) indicate that baptisms in the northern missions increased from 300,000 in 1644 to 400,00 in 1654. Although we lack comprehensive figures on baptisms during the period between 1654 and 1678, baptisms among the Opatas, Tanashumans, Jova, Mountain Pima, and other groups presumably pushed the Jesuit total to near 500,000 (Alegre 1960; Dunn 1948).

Despite the addition of new converts, the entire mission population declined from 100,000 in 1591 to approximately 63,000 in 1678—a decline of 37 percent (AGN 1678; DHM 1678). The most dramatic
losses during this period occurred in Sinaloa and Sonora, where the mission population went from 90,000 in 1638, to 78,000 in 1656, to roughly 52,000 in 1678 (AGN 1678).

During the closing decades of the seventeenth as well as during the eighteenth century the mission population as a whole continued to decline. The greatest losses during this period occurred in the mission province of Sonora, which included what is today central and northern Sonora and southern Arizona. Captain Juan Manje, who spent many years on the northern frontier, noted in 1706 that communities that once had 1,000 residents now had but 100 (Burros 1971:523). Some ten years later Father Luis Mancuso observed that many mission communities in Sonora had been reduced from 200 or 300 families to 50 families. Interestingly, Mancuso was of the opinion that native employment in Spanish mines and ranches had superseded disease as the major cause of mission depopulation (Pennington 1980:80).

While Mancuso may have correctly anticipated the abating influence disease was having on mission populations, the comments of his contemporaries suggest that disease remained the principal enemy of the mission population well into the eighteenth century. Much was implied by Father Augustin de Campos in his report from the Pimería Alta in 1720 (Alegre 1960:504). The author of the Estado de la Provincia de Sonora similarly commented in 1730 that epidemics and “other accidents,” presumably famines and floods, largely had destroyed the Pima Bajo, Opata, and Pima Alto of southern Arizona: “Today [1730] there are 12,132 adult souls, not counting small children and infants, a small number as compared with the [souls enumerated in the] ancient catalogs, which at one time exceeded 170,000 baptisms” (DHM 1730:627). Another knowledgeable Jesuit, Tomás de Miranda, observed in 1755 that the Indians continued to decline from Old World diseases, caused by the breadth of the Spaniards (Pennington 1980:88).

At the time of the Jesuit expulsion in 1767, Father Ignaz Pfefferkorn noted that he and other Jesuits who had worked in Sonora all were of the opinion that Sonora lost more than half its population between circa 1700 to 1767 (Treutlein 1949:254). This conclusion is supported by Father Aguirre’s census and family number counts from 1764 suggesting that Sonora had a total population of around 12,000 (AHF 1764). The same report indicates that the total population for all the Jesuit missions of the north had declined to approximately 30,000.

Post-Missionization Reductions among Serrano Populations

The general depopulation trend discernible throughout the Jesuit mission area also can be seen in detail in many subareas. Baptismal and census figures for individual groups indicate that many native populations were largely destroyed within a decade or two of missionization. This was particularly true in the Sierras and along the eastern slopes of the Great Divide, among groups such as the Zacateco, Tepehuán, and Irritilla.

The Franciscans, who largely monopolized the missionization of the Zacateco, reported that from roughly 1600 to 1622 between 12,000 and 14,000 natives were baptized in the mission province of Zacatecas. The province was largely isomorphic with the aboriginal homeland of the Zacateco, spilling over into the Sierras among the Tepehuán and Acaxee on the west, among the Concho to the north, and into Nuevo León to the east (López-Velarde 1964:70). Significantly, the population figures supplied by the Franciscans and incorporated in the Razón y minuta...
indicate that there were fewer than 5,000 natives under Franciscan care in 1625 (Hackett 1926:152-57).

The Irritilla in the Jesuit missions of Laguna and Parras, to the north and west of the Zacateco, fared little better than their Zacateco neighbors (Table 1). From an estimated aboriginal population of around 24,000 in 1500, the Irritilla declined to around 18,000 in 1598 (Pérez de Ribas 1944: III, 293). By 1604, the Jesuits had baptized some 5,500 natives (Dunne 1944:80), and by 1608, almost the entire Laguna population had been baptized (Pérez de Ribas 1944:III, 264). As a consequence of disease, particularly the epidemics of 1607 and 1623-25, the mission population of Parras declined to 1,569 in 1625 (Hackett 1926:152-59). The native population suffered further in later years, and in 1646, what remained of the Parras missions was taken over by diocesan clergy.7

The rapid diminution of the Irritilla was paralleled by dramatic reductions among the northern Tepehuan and the Acaxee. In 1598, there were 12,000 to 15,000 Acaxee (Pérez de Ribas 1944:III, 17). There probably were an equal number of northern Tepehuan, although it is difficult to be precise about the size of the northern Tepehuan population. In 1601, Father Armaya reported that the Jesuits had learned that there were more than 6,000 Tepehuan in the mountains near what became the mission of San Miguel (DHM 1601:67). The annua for 1597 indicates there were five Tepehuan pueblos at the time in the Valley of Atotonilco (DHM 1597:32). These were just two of many areas with Tepehuan populations. The fact that the number of Jesuits assigned to the Tepehuan equaled or surpassed the number working among neighboring groups also suggests that the Tepehuan were at least on a par numerically with the Acaxee and Laguneros.

As was the case with the Irritilla, the Jesuits by 1607 had all but completed the missionization of the Acaxee and northern Tepehuan, baptizing tens of thousands of natives in the process. Most died soon after being baptized is apparent from the Razon y minuta: in 1625 the combined population of both the Jesuit and Franciscan missions among the Acaxee was 1,065 (Hackett 1926:137). The Razon y minuta indicates there were 514 Tepehuan in the mission of Ipdé, 634 in Santa Catalina, and 264 at Guanaceví (Hackett 1926:152). There presumably were other Tepehuan, perhaps numbering in the hundreds, resident at

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7 There is some uncertainty about when the mission of Parras was turned over to diocesan clergy. Dunne (1944:185-86) suggested the transfer took place in 1646, while Decorne (1941: II, 34-35) believed it occurred in 1652.

Table 1. Population Trends among Seraxo Groups

<table>
<thead>
<tr>
<th>Year</th>
<th>1500</th>
<th>1598</th>
<th>1625</th>
<th>1638</th>
<th>1662</th>
<th>1678</th>
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<tr>
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<td>15,000</td>
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<td></td>
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<tr>
<td>Acaxee</td>
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<td>14,000</td>
<td>1,065</td>
<td></td>
<td>1,076</td>
<td>816</td>
</tr>
<tr>
<td>Xixime</td>
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<td>14,000</td>
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<td></td>
<td>2,388</td>
<td>1,900</td>
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<tr>
<td>TOTAL</td>
<td>87,000</td>
<td>60,000</td>
<td>10,014</td>
<td>10,000</td>
<td>6,526</td>
<td>3,821</td>
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</tbody>
</table>

Sources and Notes. 1500: The figures for the Acaxee and Irritilla reflect postulated pre-jesuitic reductions of 8 percent. The Tepehuan and Xixime were assumed to be as numerous as their neighbors, aboriginality, and also are thought to have lost a third of their population prior to 1598. 1598: The figures for the Acaxee and Irritilla are from Pérez de Ribas (1944:III, 17, 295). As discussed in the text, the Tepehuan and Xixime are assumed to have been as large as their neighbors 1625; (Hackett 1937:152-57). As noted in the text, the Tepehuan figure includes 500 Tepehuan who were added to the total given in the Razon y minuta to reflect those Tepehuan resident in mission communities such as San Cecilo or Cuencamé. (AHM 1638; Hackett 1937:94 ff.), 1662; (Almagro 1659:356-358). The Tepehuan total includes 766 Tepehuan who are estimated to have been residing in the Tarahumara missions. The Acaxee total includes many Acaxee who were Nahua speakers. The Xixime total includes 880 Huna. 1678; (AGN 1678; DHM 1678). The figures for the Tepehuan, Acaxee, and Xixime include hundreds of "reputed Spaniards."

Cuencamé, Saucedo, Santa Bárbara, and other mining settlements. All totaled, there may have been 2,000 Tepehuan in 1625—a fraction of the aboriginal population.

As an aside, it should be noted that 1,000 natives perished during the Tepehuan revolt in 1616–17, many but not all of whom were Tepehuan (Pérez de Ribas 1944:III, 207). The figure of 1,000 pales in comparison with the number who died during the epidemic of 1607–08 and that of 1623–25. Indeed, the consequences of these epidemics were felt for many years. Thus, Pérez de Ribas wrote in 1638 that the smallest pueblo in the province of Sinaloa (there being forty larger ones) had more people than all the Tepehuan pueblos put together (AHM 1638; Hackett 1937:101-2).

The Razon y minuta indicates that there were still 5,380 Xixime in the missions of San Andrés in 1625. Although the Jesuits first began working among the Xixime in 1607, it was not until after the Xixime revolt (1611) that large numbers of them were baptized (Dunne 1944). The Xixime's mountainous homeland, which was difficult to access, coupled with their relatively late incorporation into the mission system, apparently retarded the process of population decline. There was no escaping the ravages of disease, however, once missionization was completed and links were established with other communities in Nueva Vizcaya. Accordingly, in 1678 Father Zapata reported that the four
Xixime partidos of San Andrés had only 1,900 Christians, including 400 or 500 reputed Spaniards (DHM 1678:301-6). Paralleling this decline in absolute numbers was a loss of cultural identity, as Zapata noted that many Xixime no longer spoke their own language. The Xixime commonly spoke Nahua (DHM 1678:306), which Indian, mestizo, and mulatto mine workers brought from southern Mexico.

By 1678, the Acazcue and northern Tepehuan also had sustained additional losses, both in terms of absolute numbers and cultural identity. In his report from 1678, Zapata noted that there were only 816 Acazcue together with 285 Spaniards and their servants in the three Topia partidos of Atotonilco, Tamazula, and Badariguato. As was the case with the Xixime, Zapata found that many Acazcue had adopted the language of foreigners, conversing in Nahua more than their own language (DHM 1678:412-19). Similarly, Zapata's report (AGN 1678) indicates that the Tepehuan were rapidly losing their language and cultural identity. Zapata noted that there were 1,105 Christians in the four Tepehuan missions. Included in this figure were seventeen Opata families ("Ore speakers") in San José del Tizonazo. The partido of Santiago Papasquiao also included a pueblo (San Nicolás) with twenty-nine Xixime families who worked on the hacienda of General Cristóbal Navarre. Zapata also counted several hundred Spaniards and "other types of people" in figuring the Christian population of the Tepehuan missions (DHM 1678:310-15).

By 1678 the Zacateco, Iritilla, Tepehuan, Acazcue, and Xixime were too few in number to survive as distinct cultural entities. Not all serrano groups, however, fared so poorly. The Tarahumara, in particular, survived many of the dislocations of the early historic period (Figure 29). As late as 1944, there were approximately 44,000 Tarahumara, many of whom reportedly were living much as their ancestors had (Pennington 1965:23-24). It is wrong, however, to infer that the Tarahumara were not greatly affected by Old World diseases and that their population remained relatively stable during the historic period (Pennington 1965:23-24; 1983:277).

As we have seen, the Tarahumara weathered at least one bout with smallpox prior to 1607. We also have seen that in 1638, 1643-47, 1652, and throughout the 1660s, thousands of Tarahumara in mission and nonmission settlements along the Río San Pedro, Río Conchos, and Río Florida perished from Old World diseases (AGN 1638; 1647; DHM 1645; 1652; 1662; 1668; 1699). Like other native groups, the Tarahumara also suffered during the late seventeenth and eighteenth centuries from smallpox and other maladies (e.g., Sheridan and Naylor 1979:36-37, 83). The consequences of these disease episodes were observed by a Franciscan missionary who worked among the Tarahumara following the Jesuit expulsion:

What is certain is that the Tarahumara nation was very numerous in the past; in every part of the mountains one encounters caves full of human remains. Some of these sepulchers are not old because they contain the remains of wool cloths. These Indians did not get wool until shortly before the Holy Word came...
into these mountains. ... Besides, glass beads and bits of iron are found with them. The use of these items is not old in this kingdom (Sheridan and Naylor 1979:115).

If it is indeed true that the Tarahumara were devastated by disease, how does one explain the fact that they survived when others did not? The answer appears to be that the Tarahumara, after tremendous early population losses, made a conscious decision to isolate themselves from the outside world and to establish a "region of refuge" in the inhospitable barranca country of southwestern Chihuahua (Aguirre Beltrán 1967). This decision was made during the closing decades of the seventeenth and throughout the eighteenth century, when the Tarahumara abandoned the Río Papigochic Valley; the region about San Bernabé, Cusihuiriachic, and Coyachi; and the basins of the Río Santa Isabel, Río Satevó, and the Río San Pedro (Pennington 1963). Aboriginally, each of these areas had good-sized pueblos, some of which relied on irrigation agriculture and which were a source of laborers and commodities for Spaniards in the Santa Bárbara-Parral region (AGN 1638; DHM 1651; Griffen 1979; Hackett 1926:159; Mecham 1927:81).

Epidemics were an unanticipated consequence of dealings with Spaniards and led to significant population losses during the seventeenth century. Figures compiled by Zappa show the population of the five partidos of the older Tarahumara mission near Parral, which was founded in 1659, had declined by 1678 to 3,818. It may be recalled that during the first Jesuit entrada beyond the Valley of San Pablo in 1607, Father Juan Fonte reported that there were over 3,000 Tarahumara in a small area of what later became the lower Tarahumara missions (Pérez de Ribas 1945:III, 160). As late as 1638, a year before the mission was founded, Father Gaspar Contreras noted the region still had "innumerable Tarahumara gentiles" (AGN 1638). In 1678, the eight partidos of the newer mission of San Joaquín y Santa Ana had an additional 5,358 Tarahumara. There also were at this time several thousand Tarahumara gentiles who were awaiting baptism or who refused baptism (AGN 1678; DHM 1678). All totaled, there were approximately 13,000 Tarahumara in 1678, divided into some 2,783 families or households.

Figures on family numbers compiled by the Jesuits in 1725 and again in 1761 show that the Tarahumara population continued to decline after 1678, albeit at a much slower rate. In 1725 there were 2,408 Tarahumara families; this number dropped to 2,051 by 1761 (Dunne 1948:224, 237). Subsequently, as the Tarahumara abandoned more and more of their aboriginal homeland, withdrawing to the Sierras and the difficult barranca country of southwestern Chihuahua, their population began to stabilize. Circa 1791 there were between 9,000 and 13,000 Tarahumara (Sheridan and Naylor 1979:102, 121). About this time a Franciscan working among the Tarahumara noted that the Tarahumara "flee from contact with others and withdraw to the mountains when they see a civilized person" (Sheridan and Naylor 1979:79). This distance-maintaining behavior and the Tarahumara's actual withdrawal to the Sierras reduced exposure to disease and apparently enabled them to more than double in number during the 1800s. As noted, in 1944 there were close to 44,000 Tarahumara.

Post-Jesuit Population Reductions in Sinaloa and Sonora

THE CAHITA OF THE RIO SINALOA AND THE RIO OCORONI

As noted in the previous chapter, there are several lines of evidence that indicate or suggest that the Cahita and other native populations to the north of the Río Mocorito were unaffected by Old World diseases prior to 1593. It is significant in this regard that demographic observations made by explorers such as Obregón largely are consistent with later estimates made by the Jesuits. More specifically, Obregón noted that in 1564 there were 30,000 men more or less in the province of Cíxola, in a radius of forty leagues (168 kilometers) from the mountains to the sea, and from the Río Sinaloa (Petatlán) to the Río Mayo (Mayambo) (Hammond and Rey 1928:103). As a soldier and author of a work that was designed to impress the Crown with his administrative abilities, Obregón presumably was referring to all able-bodied men between the ages of sixteen to fifty—those who might be apportioned through repartimientos or assembled for military purposes. If this assumption is valid, and we further assume that the aboriginal Cahita did not differ greatly in terms of their age/sex distribution from the modern population of Mexico (see Cook and Simpson 1948:25–26; Sauer 1935), then the males spoken of by Obregón represented approximately a quarter of the total population. Then in 1565, there would have been 120,000 Guasave, Cahita, and cognate groups living along the Río Sinaloa, Río Fuerte, and Río Mayo. This figure is consistent with numbers given in one of the earliest Jesuit letters from the northern frontier. In 1593, Fathers Tapia and Pérez reported that they had learned there were over 100,000 natives living in villages between the Río Mocorito and the Río Mayo (Shields 1954:109–10).
In their letter from 1595, Fathers Tapia and Pérez further noted that the Río Sinaloa was "thick with people," and the Fuerte more so, and the Mayo more than the Fuerte. In another letter written that same year, Father Martín Pérez reported that there were some 4,000 warriors residing below his mission at Barorna, along a roughly twenty-kilometer stretch of the Río Sinaloa, Pérez presumably referred to men between the ages of sixteen and fifty, amounting to perhaps a quarter of the total population. One can infer, then, that there were approximately 16,000 Caña living below Barorna along the middle Sinaloa River, above the juncture of the Rio Ocotoni and the Río Sinaloa. Various sources suggest that there were another 6,000 or so Caña living above Barorna as well as along the Río Ocotoni. As early as 1594, the Jesuits had baptized over 3,300 Caña in and about Barona and San Felipe as well as 1,270 Caña in three pueblos along the Río Ocotoni (AGN 1595:84).

As a consequence of the epidemics of 1593 and 1601-02, the Caña proper of the Río Sinaloa and the Río Ocotoni declined from approximately 22,000 at the time of missionization to about 7,000 in 1603 (Table 2). Captain Martínez de Hurdalaic commented in a letter that the Jesuits had baptized 12,000 natives of the Río Sinaloa, 4,000 of whom had perished from disease and other calamities (Dunne 1940:74).

It is doubtful that Hurdalaic's figure of 4,000 included the many Caña gentiles who perished during the epidemics of 1593 and 1601-02—individuals who were never counted because they died before a priest could attend to their physical and spiritual needs. It is also doubtful that Hurdalaic's estimate included infants and children. Recall that Father Tapia reported that three years of the children that he baptized died during the epidemic of 1593. Large numbers of infants and children also perished during the epidemic of 1601-02. Pérez de Ribas (1944:1, 264) commented that more than 6,000 infants were baptized and died prior to about 1603. The majority of these infants would have belonged to the Guasave and Caña of the Río Sinaloa.

As Table 2 indicates, the Caña proper experienced additional losses during the first quarter of the seventeenth century. During the period from 1626 to 1636 there apparently were few if any major epidemics. Several vecinos indicate or suggest that the period also was one of good harvests (AGN 1626:317; 1628:340-41). A low incidence of disease and malnutrition presumably increased fertility, while at the same time lowering the infant mortality rate. This presumably explains the 24 percent increase in population that the Caña of the Río Sinaloa and Río Ocotoni experienced between 1626 and 1638. These gains were soon negated, however, with the new wave of epidemics and famine that began about 1636, as reflected in the figures from 1656 and 1678. At the time of Zapat's report in 1678, the Caña proper had declined to 1,298.

In his report Zapat noted that many Caña spoke Nahua and Spanish. Apparently, the adoption of these languages was coincident with the intermarriage of Caña, Tarascans, Mexica, blacks, and Spaniards, or what Bishop Tamaryon y Romeral (1937:224) later referred to as "vecinos." Interestingly, after 1678, the Caña population began to rebound and, by 1759, the population had more than doubled. This recovery may have been due, in part, to an enlarged gene pool and the addition of African, European, and Mesoamerican traits that promoted resistance to disease (Morisky 1971).

THE GUASAVE AND AHOME OF THE LOWER RIO FUERTE

Demographic data for the Guasave and the Ahome of the Río Fuerte, who apparently were related to the Guasave, indicate that both groups followed much the same path as the Caña proper (Table 3). About 1598 there were five Guasave pueblos with 2,000 vecinos. The Ahome were said to number 1,100 vecinos (Pérez de Ribas 1944:1, 202, 278). A conservative estimate would be that the Guasave and Ahone
lost one third of their population during the epidemic of 1593 and the
years immediately following. It is suggested, therefore, that aboriginally
there were 15,000 Guasave and 7,500 Ahome.

As Table 3 indicates, by 1624 both groups had declined by 81 per-
cent. Because the Guasave and Ahome were not distinguished from
other groups in the listing of households in the fragmentary history, it is
unclear how both groups fared during the period from 1626 to 1636.
The figures from 1636 would seem to suggest that the Guasave and
Ahome, like other native groups, enjoyed a respite of sorts from disease.
The trend in later years, nevertheless, was in a downward direction until
the second quarter of the eighteenth century, when a population recov-
er of sorts occurred.

THE CÁHITA OF THE RÍO FUERTE

Because the Cahuí of the Río Sináo and the Guasave were the
first groups missionized by the Jesuits, neither group experienced major
population losses prior to missionization. Without exception, other native
groups in northern Sináo, Sonora, and Arizona were affected by one
or more epidemics prior to sustained contact with the Jesuits. This is
ture, for example, of the Cahuí-speaking population of the Río Fuerte
(Table 4).

Recall that in 1533, Diego de Guzmán's expedition reported that
the Cahuí of the upper Río Fuerte were living in twenty or twenty-five
towns, each with 100 to 500 houses (Hedrick and Riley 1976:41). If we

conservatively allow that the Cahuí were divided among twenty commu-
cinities, and that these settlements averaged 150 houses, each with five
residents, then the Cahuí would have numbered approximately 15,000
in 1533. Although we lack data on the size of the Cahuí population in
1591, Father Gonzalo de Tapía visited the Cahuí in 1593 and reported
they were living in twenty-five rancherías, presumably the same settle-
ciments enumerated by Diego de Guzmán.

As we have seen, the Suáqui, Tehueco, and Cahuí all apparently
were affected by the epidemic of 1601–02 and most likely the epidemic
of 1593 as well. Determining the impact of these disease episodes is
difficult because the first Jesuit comments on the size of the Cahuí
population of the Río Fuerte were coincident with the epidemic of
1606–07, which devastated the Cahuí and other groups along the Río
Fuerte. Pérez de Ribas (1944:1, 278, 344), who was working at the time
along the lower Río Fuerte among the Ahome, noted that there were
approximately 1,000 Cinaloa families living in three pueblos or mission communities about 1608. If we allow that there were another 500 families who remained to be baptized, and that each family had been reduced by disease to one member, the Cinaloa would have numbered approximately 6,000. Since the epidemic of 1605–07 reportedly claimed thousands of lives in the west coast missions, principally among the Cinaloa and Tehuenco, there may have been 8,000 Cinaloa at the time of the epidemic. If so, then the Cinaloa population was reduced by upwards of half, from approximately 15,000 to 8,000 prior to missionization. Presumably, the Tehuenco and Suaqui, who also numbered approximately 5,000 around 1608, experienced comparable losses prior to this date.

As Table 4 indicates, the Câhiita of the Río Fuerte sustained additional population losses during the decades following missionization. Note that the Cinaloa decreased by only 16 percent between 1608 and 1624, while the Tehuenc and Suaqui decreased by 63 and 24 percent, respectively. The figure of 18 percent for the Cinaloa is somewhat misleading as the Cinaloa population was augmented by migrations of Zoéns and Huites who left their homes along the headwaters of the Río Fuerte and settled with the Cinaloa of Toro. We know, for instance, that at least several hundred Huites descended from the Sierras and settled with the Cinaloa in 1614 (Dunne 1940:164–65; Pérez de Ribas 1944I, 351–63). This infusion of people undoubtedly compensated for Cinaloa population losses between 1607 and 1624. However, thereafter the Cinaloa declined at much the same rate as their Câhiita neighbors.

Table 4 shows that it was not until the second quarter of the eighteenth century that the Suaqui, Tehuenc, and Cinaloa rebounded from what was more than a century of population decline.

THE MAYO AND YACUI

There is good reason to believe the Mayo and Yacui, like the Cinaloa, were reduced in number by upwards of half during the years leading up to the founding of permanent missions. In 1533, the Second Anonymous Reporter observed that the Río Yaquimi (Yacui) had the largest towns and was the most densely populated river explored by Diego de Guzmán (Hedrick and Riley 1976:49). Some thirty years after Guzmán's entrada, Obregón also observed that the Yaquimi was the most thickly populated river in what is today northern Sinaloa and southern Sonora. Obregón further commented that 15,000 men could be found along the lower Yaquimi in a distance of ten leagues (forty-two kilometers) from the

sea (Hammond and Rey 1928:257–58). Again, Obregón presumably referred to all able-bodied men between the ages of sixteen and fifty. If, as suggested above, this cohort constituted roughly a quarter of the total population, the Yaquimi would have numbered around 60,000 aboriginally (Table 5). Jesuit figures from the years 1617 to 1622 indicate that there were approximately 30,000 to 35,000 Yaquimi at this time (AGN 1616:241; 1621; Pérez de Ribas 1944II, 63–65). It would appear, then, that the Yaquimi lost upwards of half their population prior to 1617, presumably during the epidemics of 1616–17, 1611–12, and perhaps that of 1606–07.

Though the exploration chronicles and later historical materials indicate with some reliability that the Yaquimi were the most numerous Câhiita-speaking population, the Yaquimi did not greatly outnumber their Mayo neighbors immediately to the south. This much is apparent from the observation of Antonio Ruiz, a frontiersman of many years in Sinaloa and one of a handful of Spaniards resident at San Felipe when the Jesuits arrived in 1591. In a brief account of his experiences, Ruiz noted that he participated in 1583 in an expedition to determine the potential for encomiendas or repartimientos along the Río Mayo. Ruiz further noted that he acted as clerk during the expedition and counted 24,000 houses more or less from the mountains to the sea (AGN n.d.; Sauer 1935:17). Although Ruiz was quite explicit about the fact that his job was to count houses and not people (Sheridan 1981:76), one is tempted to agree with Sauer who suggested that Ruiz or a copyist made a clerical error, substituting houses for persons. It is difficult to believe the Mayo and their upstream neighbors could have numbered between 125,000 and 150,000, which is what is implied if one assumes that each of the 24,000 houses counted by Ruiz had five or six residents. Inasmuch as Ruiz indicated that his clerical duties were for the purpose of calculating encomiendas and repartimientos, it seems more likely that the figure of 24,000 referred to able-bodied men above the age of sixteen, which, again, probably constituted approximately 25 percent of the total population. The population of the Río Mayo would, therefore, have numbered close to 100,000.

Not all the men (or houses) that Ruiz counted would have belonged to the Mayo, as Ruiz noted that the Spaniards ascended the Río Mayo to the first pueblo in the Sierras. An indeterminate number of men must have been Conicati, Macoyahui, Tepahue, and perhaps Chinipas. If we generously allow that 40 percent of the people Ruiz counted belonged to these groups, the Mayo would have numbered around 60,000, equal to the Yaquimi (Table 6).
### Table 5. Population Trends among the Yaqui

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<tr>
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<td>60,000</td>
<td>25,725</td>
<td>2,387</td>
<td>1,070</td>
<td>1,340</td>
<td>16,000</td>
<td>5,250</td>
<td>2,697</td>
<td>2,645</td>
</tr>
<tr>
<td>Bähcum</td>
<td>8,000</td>
<td>1,061</td>
<td>310</td>
<td>899</td>
<td>2,539</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Córrit</td>
<td>3,800</td>
<td>976</td>
<td>337</td>
<td>467</td>
<td>1,900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hañhiris</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5,077</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>60,000</td>
<td>35,000</td>
<td>20,430</td>
<td>15,318</td>
<td>7,549</td>
<td>6,733</td>
<td>16,000</td>
<td>21,912</td>
<td></td>
</tr>
</tbody>
</table>

Sources and Notes: 1500: See text. 1617: (AGN 1619a:241). 1624: (AGN 1624a). 1628: (Sauer 1953-14). Population totals were derived by multiplying household numbers by 4.9 (see text). 1634: (AGN 1634). The figures reflect the division by 66 percent of the number of inhabitants listed in the census (see text). 1678: (AGN 1678). 1720: (Alegre 1969:491-518). As discussed in the text, the figures were derived by multiplying family numbers by 4.2. 1741: (Spicer 1980:49). This figure probably does not include a large but indeterminate number of Yaqui who apparently worked away from the missions. 1759: (Tamarón y Romeral 1917). Bishop Tamarón y Romeral gave only family numbers for Hañhiris. The total population was derived by multiplying the number of families (1,136) by 3.8, which is the average family size for the six other Yaqui settlements. Note also that the bishop commented that many thousands of Yaqui worked outside the missions.

Significantly, when Father Pedro Méndez began working among the Mayo in 1614, there were approximately 30,000 natives (Pérez de Ribas 1944:II, 13). Apparently the Mayo lost half or more of their population during the epidemics of 1611-12, 1606-07, and perhaps that of 1601-02.

From a population of around 35,000 at the time of missionization in 1617, the Yaqui declined to approximately 20,000 in 1624 (AGN 1624a). The Mayo experienced comparable losses following missionization, declining from 30,000 in 1614 to 16,000 in 1624. During the decade following the highly destructive epidemic of 1623-25, the Mayo population continued to decline, whereas the Yaqui rebounded significantly. It is perhaps significant that the anuaí for the rectorado of San Ignacio (AGN 1628:344; AGN 1635:264; 1636), of which the Yaqui and Mayo were a part, highlight what was "an almost continuous" problem of "dangerous childbirth," particularly stillborn and diseased children. Did more Mayo infants die at birth or shortly thereafter relative to the Yaqui during the decade following the epidemic of 1623-25, and if so, why? These questions remain unanswered.

As Table 6 indicates, the gains that the Yaqui made between 1626 and 1638 were soon negated. The population losses experienced by the Mayo during the mid-1600s were far less severe. In 1678 both the Mayo and Yaqui had declined to less than 8,000. It should be noted that recently Hu-DeHart (1981:50-52) suggested that the population decline evident at the time of Zapata’s visita was more apparent than real and that many Mayo and Yaqui lived away from the missions as laborers in Spanish mines or on haciendas. This inference is not supported by empirical data, as there were relatively few mines or other Spanish holdings in Sonora or other areas of Nueva Vizcaya at this time that could have employed thousands of Mayo or Yaqui (see AGN 1657a; Bannon 1953:110; Navarro García 1967;1967:214; Polzer 1972a:150; West 1949:48).

It was not until after 1686 that large numbers of Mayo and Yaqui — numbering in the thousands — were drawn away from the missions by employment opportunities. The Mayo missions, which were a short distance from the mines upriver, seem to have been particularly hard hit by this labor migration. Bishop Tamarón y Romeral’s report indicates there were only 4,000 Mayo resident in the missions in 1759. There apparently were several thousand additional Mayo working at Alamos, Baroya, and other mines in the foothills as well as on Spanish farms and ranches (Acosta 1949:100-101).

After reaching a nadir about 1720, the Yaqui population rebounded sharply to some 16,000 in 1741 (Spicer 1980:50) and to over 21,000 in 1759. These impressive gains, despite significant labor migration, apparently were made possible, at least in part, by large and regular food surpluses, which characterized the post-1720 period (Spicer 1980:30-37). Presumably, the Yaqui’s regular food supplies and general health, coupled with more than a century of exposure to disease, made it possible.

### Table 6. Population Trends among the Mayo

<table>
<thead>
<tr>
<th>Year</th>
<th>1500</th>
<th>1614</th>
<th>1624</th>
<th>1638</th>
<th>1656</th>
<th>1678</th>
<th>1720</th>
<th>1759</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sta. Cruz</td>
<td>60,000</td>
<td>50,000</td>
<td>10,500</td>
<td>13,413</td>
<td>3,684</td>
<td>2,803</td>
<td>2,520</td>
<td>1,200</td>
</tr>
<tr>
<td>Etchojio</td>
<td>60,000</td>
<td>30,000</td>
<td>1,641</td>
<td>1,480</td>
<td>2,031</td>
<td>2,104</td>
<td>1,680</td>
<td>1,156</td>
</tr>
<tr>
<td>Tesa</td>
<td>60,000</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
<td>559</td>
<td>497</td>
<td>420</td>
<td>388</td>
</tr>
<tr>
<td>Nava</td>
<td>60,000</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
<td>559</td>
<td>497</td>
<td>420</td>
<td>388</td>
</tr>
<tr>
<td>Carnegie</td>
<td>60,000</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
<td>559</td>
<td>497</td>
<td>420</td>
<td>388</td>
</tr>
<tr>
<td>Cuizimbo</td>
<td>60,000</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
<td>559</td>
<td>497</td>
<td>420</td>
<td>388</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>60,000</td>
<td>30,000</td>
<td>16,000</td>
<td>13,413</td>
<td>9,351</td>
<td>7,197</td>
<td>6,093</td>
<td>3,883</td>
</tr>
</tbody>
</table>

Sources and Notes: 1500: See text and comments of Antonio Ruiz (AGN n.d.; Sauer 1955:17). 1614: (Pérez de Ribas 1644:II, 24). 1624: (AGN 1624a). 1618: The catalog of 1624 indicated that the Mayo constituted 73 percent of the mission population of the Río Mayo. This percentage was used to calculate the number of Mayo households in 1658, using the figures from the fragmentary history, which were then multiplied by 4.9. 1656: (AGN 1656). As noted in the text, the numbers were derived by dividing the number of confessants in each community by 64 percent. 1678: (AGN 1678). 1720: (Alegre 1969:491-518). The figures were derived by multiplying family numbers by 4.2 (see text). 1759: (Tamarón y Romeral 1917).
for women to have more children and for these children to live to reproductive age. This much is suggested by a comparison of the total population and family numbers reported for each Yaqui community by Bishop Tamaron y Romeral in 1759. Despite the fact that many thousands of Yaqui were working outside the mission, the average Yaqui family or household had 3.8 members (Tamarón y Romeral 1937:244-45). If we allow that there were many households with one or two adult males who worked away from home, many Yaqui households would have had six members, a figure that is consistent with the Yaqui’s population recovery (see Gerhard 1982:268).

THE NEBOME AND PIMA BAJO

The Yaqui’s upstream neighbors, the Nebome, are yet another group for whom there is evidence of major population losses prior to incorporation into the mission system (Table 7). In 1615, Father Diego de Guzman reported that the Nebome or Pima Bajo of the middle Rio Yaqui were divided among ninety large rancherias or pueblos. Although Pennington (1980:33) has suggested on the basis of modern settlement patterns that these rancherias had an average of five families, Guzman specifically mentioned “rancherias grandes o pueblos.” Many of these “large rancherias” probably had between twenty or thirty dwellings, as was the case with the Nebome’s neighbors, the Sisbrotari Opatas. We know some Nebome rancherias or pueblos had upwards of 500 residents, as 350 people from one village fled their homeland in 1614, leaving behind 150 neighbors who sought refuge at San Felipe the following year (AGN 1615). In his account of the Ibara expedition, Obregon commented that the town of Oera, which apparently should be equated with Onabas, had 1,000 “excessively grouped” flat-roofed houses (Hammond and Rey 1928:108).

Sauer’s (1935) suggestion that there were 25,000 Pima Bajo, aboriginally, may well be a conservative estimate, particularly if we allow that the Pima Bajo of the middle Yaqui numbered, alone, close to 20,000. As noted in our discussion of the catalog of 1624, at this time there were approximately 11,750 Nebome under Jesuit care. To estimate the aboriginal population we must add to the figure of 11,750 at least several thousand Nebome who perished from disease at the time of the Nebome exodus (1614-15) as well as during the epidemics of 1616-17 and 1619-20 (Perez de Ribas 1944:II, 157). There also were at least several thousand Pima Bajo who were awaiting baptism in 1624.

<table>
<thead>
<tr>
<th>Table 7. Population Trends among the Nebome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>1580</td>
</tr>
<tr>
<td>1619</td>
</tr>
<tr>
<td>1624</td>
</tr>
<tr>
<td>1638</td>
</tr>
<tr>
<td>1656</td>
</tr>
<tr>
<td>1678</td>
</tr>
<tr>
<td>1730</td>
</tr>
<tr>
<td>1759</td>
</tr>
</tbody>
</table>

The Nebome of the middle Yaqui were one of three Pima Bajo subdivisions, the other two being the Ures of the lower Rio Sonora and the Rio San Miguel and the Mountain Pima of Yecora, Maicoba, Onapa, and Yepachi (Pennington 1980:36). There is good reason to believe that the Ures were affected by the epidemic of 1623-25, if not by earlier epidemics. Because of their mountainous homeland and relative isolation during the opening decades of the 1600s, the Mountain Pima are thought to have largely escaped the effects of disease until about 1640.

As indicated in Table 8, the Ures and Mountain Pima each are estimated to have numbered around 6,000, aboriginally. During the seventeenth century, both groups as well as the Nebome largely were destroyed.
Table 8. Population Trends among the Ures and Mountain Pima

<table>
<thead>
<tr>
<th>Year</th>
<th>Ures</th>
<th>Nacucci</th>
<th>S. Pablo</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>6,000</td>
<td>6,000</td>
<td>4,000</td>
<td>18,000</td>
</tr>
<tr>
<td>1619</td>
<td>6,000</td>
<td>6,000</td>
<td>4,000</td>
<td>18,000</td>
</tr>
<tr>
<td>1624</td>
<td>6,000</td>
<td>6,000</td>
<td>4,000</td>
<td>18,000</td>
</tr>
<tr>
<td>1636</td>
<td>6,000</td>
<td>6,000</td>
<td>4,000</td>
<td>18,000</td>
</tr>
<tr>
<td>1656</td>
<td>3,000</td>
<td>3,000</td>
<td>2,000</td>
<td>8,000</td>
</tr>
<tr>
<td>1678</td>
<td>3,000</td>
<td>3,000</td>
<td>2,000</td>
<td>8,000</td>
</tr>
<tr>
<td>1759</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>3,000</td>
</tr>
</tbody>
</table>

Sources and Notes: 1500, 1619, 1624, and 1636: These figures are estimates that were derived by working backward from known population numbers in 1555 and assuming premissionization losses comparable to those experienced by the Néhüéne and their non-Pima Bajo neighbors. 1656: AGN 1656. As noted in the text, the figures reflect the division by 64 percent of the number of confesiones listed in the catalog. The figures for the Mountain Pima are based on the annals of 1653, which noted there were 400 vecinos (male heads of household) associated with what became the mission of Yecora. It was assumed that each household had 4.3 members. Because Zapata’s report suggested that Yecora and the remainder of the Mountain Pima area were on a par, numerically, it was assumed that the entire area had a population of 3,000 in 1655. 1678: AGN 1678. 1759: DHH 1759. As discussed in the text, the figures were derived by multiplying family numbers by 4.6. Note that the figure for Onapa includes twenty-six families in the misión of “Señor de los Ángeles” and thirteen families in San Ignacio de Ometepec. The figure for Yecora likewise includes ten families in Santa Ana. The figue for Malicoba, for which no information was given, is based on Penington’s (1980-84) observation that Malicoba’s population averaged 170 during the eighteenth century. 1759: Tamarindo’s Reminiscencias. The Onapa figures includes forty Pima living in nearby Tarachi. The San Pablo del Pescadero figure also includes 123 residents of El Guacilar.

The extent of population decline during the years of waiting for a resident priest is perhaps reflected in various reports on the Sisibotari or Sahuaripa Opata (Table 9). In 1620, an unnamed Jesuit working among the Néhüene was visited by the Opata cacique, Gran Sisibotari, who informed the Jesuit that the Sisibotari Opata were living in seventy rancherias. From later sources we know these settlements had between twenty and thirty structures of potted adobe (AGN 1628). If we assume the average rancheria had twenty-five households, each with five members, then the total population for all seventy rancherias would have been 8,750. In 1632, when Father Pedro Méndez completed the missionization of the Sisibotari, there were 900 married heads of household in three pueblos (Pérez de Ribas 1896:1, 393). If we allow that the average household had 49 members, as was apparently the case in 1638, then the Sisibotari would have numbered around 4,410 in 1632. The Sisibotari, in effect, were reduced by almost half prior to missionization, presumably during the epidemics of 1616-17, 1619-20, and 1623-25.

Because the Ayvino and Batucos had much the same history of contacts with the Jesuits as their Sisibotari kin and neighbors, both groups are likely to have experienced the same premissionization losses (90 percent) as the Sisibotari. Apparently as a result of the spread of disease, two Jesuits visited the Ayvino in 1622 and reportedly baptized over 400 infants, four years and under. If we allow that the Jesuits baptized 80 percent of all infants during this brief entrada and that infants constituted 10 percent of the total population (Sauer 1935:27), then there were at least 5,000 Ayvino aboriginally. The Batucos, who reportedly lived in 100 rancherias, each with an average of perhaps twenty houses, would have numbered 10,000 aboriginally (Table 10).
Table 9. Population Trends among the Sisiborari Opatas of the Río Sahuaripa

<table>
<thead>
<tr>
<th>Sahuaripa</th>
<th>1500</th>
<th>1628</th>
<th>1638</th>
<th>1656</th>
<th>1678</th>
<th>1720</th>
<th>1759</th>
<th>1764</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anwechí</td>
<td>8,750</td>
<td>4,410</td>
<td>4,704</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacanora</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>752</td>
<td>168</td>
<td>176</td>
</tr>
<tr>
<td>San Mateo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>596</td>
<td>126</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>8,750</td>
<td>4,410</td>
<td>4,704</td>
<td>3,127</td>
<td>2,007</td>
<td>597</td>
<td>476</td>
<td>451</td>
</tr>
</tbody>
</table>

Sources and Notes: 1500 and 1628: See text and AGN 1620; 1628; Pérez de Ribas 1944: II, 176-79, 1638. The fragmentary history noted that the Nébonce and Sahuaripa Opatas were divided among eight missions with 2,400 heads of household. Data for the same eight communities from the catalog of 1656 indicates that the relative proportion of the population in the three Opatas missions was 40 percent. Thus this percentage was applied to the 2,400 households reported in 1636, which, in turn, were multiplied by 4.9. 1656. As noted in the text, the figures reflect the division by 64 percent of the number of confessois given in the catalog of 1678 (AGN 1678). 1720 (Alegre 1969: 518). As discussed in the text, the figures were derived by multiplying family numbers by 4.2. 1759; (Tamarín y Romeral 1937). Note that the figure for Sahuaripa includes half the population of Teopari (61), which was said to be occupied by Jews and Opatas. Note also that Apache raids led to the abandonment of San Mateo circa 1750. 1764; (AHH 1764). The figures are based on family numbers, which were multiplied by 3.2. The figure for Sahuaripa includes half the population (61) of nearby Teopari, which Bishop Tamarín earlier indicated included Opatas and Jews.

As noted in Tables 9 and 10, the Ayvinos, Barucos, and Sisiborari are all estimated to have lost half their population prior to the founding of permanent missions. During the next decade (1628-38), the Ayvinos and Barucos continued to decline in number, albeit at a much slower rate, while the Sisiborari actually rebounded slightly. It is not clear why the Sisiborari fared better, although conceivably they had a longer history of exposure to disease than the Ayvinos and Barucos. Whatever the case, the gains that all three Opatas groups made were short-lived; during the second half of the eighteenth and early nineteenth century the Sisiborari, Ayvino, and Batoaco dwindled in number. By 1764, when Apache raids in Sonora were making life especially difficult, all three groups diminished to the point where they were difficult to distinguish from the emerging mestizo population of Sonora.

THE OPATA OF CENTRAL AND NORTHERN SONORA

Almost a decade after missions were established among the Sisiborari, Ayvino, and Batoaco, the Jesuits extended the mission frontier northwest to the Hoyo-speaking Opatas of the Río Sonora. Between 1645 and 1648, the Opa of the Río San Miguel, Río Montecruz, Río Fronteras, and Río Bavispe also were brought into the mission system. There is good reason to believe each of these groups sustained population losses prior to missionization. There is particularly good evidence of premisionization losses among the Opa of the Río Sonora and the Río Montecruz (Table 11). Both peoples figure prominently in several of the explorers' early accounts, which described them as both numerous and sophisticated. Oregón specifically noted that the "province of Señora," which encompassed the Sonora Valley from Mazoahu to Arispe (Guarazpi), and the Montezuma Valley from Oposura to Curumup (Curiup), had over 20,000 inhabitants (Hammond and Rey 1928:164). Reportedly, Guarazpi had 600 houses and well-planned streets; in Curumup there were 500 houses with enemy scalps displayed "in streets and prominent places" (Hammond and Rey 1928:173-75).

In the area of 1639 from the mission of San Ignacio, Father Diego Bandeispe reported that there were 10,500 souls "more or less" in the Sonora Valley (AGN 1639). We know from Pérez de Ribas that there...
were approximately 5,000 natives dispersed among numerous rancherías in the Río Mocotzuma Valley, in and about Cumupas and Opopura (Pérez de Ribas 1896-II, 488). A comparison of Obregón’s estimate of more than 20,000 with the Jesuit figures for the Sonora and Río Mocotzuma, totaling 15,500, suggests that the population of “Señora” had been reduced by almost 25 percent prior to missionization.

It may well be that the Opatas of the Sonora and Mocotzuma valleys were affected by the epidemic of 1623–25, which, as we have seen, affected neighboring Opatas and Pima Bajo groups. The Señorans could have lost 35 percent of their population during the epidemic. This figure is suggested by studies of virgin soil epidemics (Dixon 1962; Steinmann and Steinmann 1945) and certainly is in keeping with the lethal character of the epidemic of 1623–25. Recall that the Jesuits in several areas described the epidemic as the worst ever seen. Conceivably the Señorans recouped some of their earlier losses, perhaps 10 percent or more, during the relatively disease-free years from 1626 to 1638.

As often was the case, the founding of a permanent mission in the Sonora Valley in 1638 was coincident with an epidemic that claimed the lives of many Opatas. Again in 1645 the Opatas of the Río Sonora and other inland valleys were affected by an epidemic of what appears to have been malaria. In 1646, when we get the first thoroughgoing report, the Jesuits noted that there were 965 families with 1,185 children of doctrine in the middle Sonora Valley. These figures suggest that a majority of families had only one child aged five to twelve. Apparently, many families lost one or two children during the epidemics of 1638 and 1645.

Between 1647 and 1650, the Jesuits established new missions throughout the Opotera, baptizing over 20,000 Opatas. This figure reportedly did not include children who were earlier baptized in 1645 in the San Miguel Valley, along the upper Río Sonora and Río Mocotzuma, and among the Guasabas of the Río Bavispe (AHH 1666: Polzer 1972a: 274). In 1656 the population of the entire Opotera (Table 12), including the Sisibotari, Aiyino, and Baturce, was approximately 30,000 (AGN 1653a: 1678). During the next two decades the Opatas population was reduced to roughly 14,000. This number again was cut by over half during the next half century. Figures from 1730 show the Opatas numbered approximately 7,000 (DHM 1730). Although during the next thirty years the Opatas population stabilized somewhat, it was impossible to mount a recovery in the face of increasing Apache depredations in Sonora. Intermarriage with Spaniards, who seem to have been particularly attracted to Opatas women (Spicer 1962), also contributed to further “reductions” in the Opatas population. By the turn of the nineteenth century the Opatas were a vanishing minority in Sonora (Radding 1979; Zeniga 1835).

Assessing the Impact of Disease in Poorly Documented Areas

FOOTHILL AND MOUNTAIN POPULATIONS OF SINALOA

There were numerous groups who inhabited the foothills and Sierra along the present-day border of Sinaloa and Chihuahua, and Chihuahua and southern Sonora, who were largely destroyed during the seventeenth century. In the foothills above the Río Mocotito and the Río Sinaloa dwelled various “tribes” collectively known as the Com italiano, and known individually as Comitauto, Chiñata, Cahuameto, and Bacapa. To the north of the Comitatio, in the foothills above the Río Fuerte and the Río Mayo, dwelled the Huies, Zoes, Chiñita, Guazapari, Tepahu, Tenori, Macoyahu, Conicari, Bactoia, and Varo. Although each of these groups are known or suspected to have been affected by epidemics that spread from the lowland Cñita, the precise consequences of these epidemics in the foothills and Sierra are largely unknown.
Table 12. Population Trends among the Opata, Pueblos, and Pima Alto

<table>
<thead>
<tr>
<th>Year</th>
<th>Opata</th>
<th>Pueblos</th>
<th>Pima Alto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>70,000</td>
<td>40,000</td>
<td>14,000</td>
</tr>
<tr>
<td>1638</td>
<td>67,500</td>
<td>37,500</td>
<td>13,750</td>
</tr>
<tr>
<td>1656</td>
<td>65,000</td>
<td>35,000</td>
<td>13,000</td>
</tr>
<tr>
<td>1678</td>
<td>62,500</td>
<td>32,500</td>
<td>12,250</td>
</tr>
<tr>
<td>1710</td>
<td>60,000</td>
<td>30,000</td>
<td>11,500</td>
</tr>
<tr>
<td>1764</td>
<td>57,500</td>
<td>27,500</td>
<td>10,750</td>
</tr>
</tbody>
</table>

Castini during another earlier entrada also reported that some people had perished (AGN 1626:148-49).

The entradas of Fathers Godinez and Castini occurred sometime between 1619 and 1625. Even before this time, in 1616-17, what appears to have been smallpox (cocoliztli) spread well up into the foothills of southern Sonora. This presumably was the case in 1614 as well, when many Nébome fled their homes in the Sierras. In point of fact, the Chinipa and their neighbors weathered numerous bouts with disease before the Jesuits or other Spaniards were in a position to report their numbers.

In his pioneering study of aboriginal population numbers, Sauer (1935) suggested an aboriginal population of 15,000 for the Comanito. Sauer's estimate should be seen as conservative, for while Sauer acknowledged the importance of disease, he did not pursue systematically the evidence of disease and its consequences, particularly evidence that the Comanito suffered during the epidemics of 1601-02 and 1606-07. Father Pedro Velasco reportedly baptized upwards of 6,000 Comanito during the years from 1607 to 1611 (Dunne 1940:101). Figures from 1624 show there were only 1,400 Comanito at Chihuahua and another 900 in the mission of Yecora (AGN 1624a). In 1662, the largely Comanito-speaking missions of Oguera, Bacubirito, and Chihuahua had a total population of 1,576 (Alegre 1959:353). By 1678 this number had declined further to 664 (including Chichuris) (AGN 1678).

The Huíes, Zoës, Chinipa, Guazuápari, Tepahue, Temori, Macoyahui, Conicari, Bacira, and Varohio all were estimated by Sauer to have numbered around 15,000. Again, this figure should be considered a conservative estimate, as Sauer relied primarily on Jesuit reports that postdate the epidemics of 1616-17 and 1623-25. By 1670, the Chinipa and their neighbors largely were destroyed (Bannow 1939; DHM 1678), and by 1700 their homeland was rapidly being appropriated by the Tarahumara. A similar process of numerical diminution followed by assimilation occurred among the various "tribes" above the Río Mayo and Río Fuerte, among the Tepahue, Bacira, and Macoyahui.

Prior to the epidemic of 1623-25, the Tepahue, Conicari, and Macoyahui were distinct groups and still numbered around 5,400 (AGN 1624a). By 1678, all three groups had declined to 1,305. Included in this number were an unspecified number of Conicari who had adopted the language of their Mayo neighbors (DHM 1678). In 1764, the settlements of Conicari, Macoyahui, and Tepahue together had only 1,000 inhabitants, and apparently the inhabitants of Conicari as well as Tepahue were both now speaking Cahita (Tamarón y Romeral 1937:240-41).

Because of the time and effort involved in ministering to populations living in difficult and mountainous terrain, the Jesuits during the early 1600s encouraged groups such as the Huíes and Zoës to leave their homes in the mountains and to settle with or near established lowland Cahita missions. Only occasionally did missionaries visit the Chinipa and their neighbors. Significant, when permanent missions were finally approved and resident priests sent to the Sierras in the late 1620s, they often found that Old World diseases had preceded them. In 1626, for example, Father Julio Pascual reported that three quarters of the Chinipa children who were baptized during an earlier visita by Father Godinez were dead; over a third of the children baptized by Father.
THE PUEBLOS

Although there has been considerable research on the Pueblos of the American Southwest, including native historical demography (e.g., Zubrow 1974), it is only in recent years that anthropologists and historians have begun to consider the impact that Old World diseases had during the early historic period (Dobyns 1966:39). Assessing the impact of disease in the American Southwest has been difficult because of the relative paucity of extant documentation from the sixteenth and early seventeenth centuries. Although the Franciscans played a prominent role in the colonization of New Mexico, relatively few reports, letters, or other documents have been located pertaining to the years between 1598 and 1660. Many reports apparently were destroyed during the Pueblo Revolt, while still others remain to be discovered in the archives of Mexico and Spain.

Estimates of the aboriginal population of the Pueblos, including Zuni and the Hopi, have ranged from 20,000 to well over 100,000, with most researchers accepting a figure of 50,000 (e.g., Schroeder 1972). Significantly, the Franciscans reported that they baptized the entire Pueblo population, amounting to some 60,000 souls, between 1608 and 1630. Although researchers such as Scholes (1930:97n13) believed this figure was "an obvious exaggeration," there is no reason why the Franciscans could not have baptized 60,000 natives. We know for a fact that the number of friars working in New Mexico increased from nine to fifty between 1608 and 1630.

What is difficult to believe is not that the Franciscans baptized 60,000 natives, but that they baptized the entire Pueblo population by 1630. At this time, and for many years to come, there was a large but incalculable number of Pueblo traditionalists who rejected Christianity. Also, if we acknowledge the likelihood that what happened in northern Mexico also happened in the American Southwest, then there undoubtedly were many thousands of Pueblo Indians who died before the Franciscans ever had a chance to propose baptism. This much was suggested by Fray Vetancurt (1961:276) in the late 1600s, when he noted that the Hopi numbered more than 14,000 and subsequently were consumed by disease, apparently at the time of missionization or shortly thereafter.9

In point of fact, and as indicated on Table 12, there may well have been over 100,000 Pueblo Indians in 1598. Importantly, in 1638 the comissary general of the Franciscans, Father Juan Prada, reported that while 60,000 natives had been baptized in New Mexico, only 40,000 were alive, the other 20,000 reportedly perishing from smallpox and other maladies (Hackett 1937:108).

The destruction wrought by disease among the Pueblos is further reflected in the wholesale abandonment of villages in the Río Grande Valley during the early seventeenth century (Schroeder 1972, 1979). The accounts of Spanish explorers, dating from 1540 to 1590, indicate there were somewhere between seventy-five and ninety pueblos in the Río Grande drainage aboriginally (Schroeder 1972:48). By 1643, only forty-three pueblos were still occupied (Schroeder 1972:35). Moreover, major population losses occurred in pueblos that persisted like Pecos. Kessell (1979:170) has shown that the population of Pecos declined by 40 percent between 1622 to 1641, from a little over 2,000 to 1,189.

A population of 40,000 for the Pueblo Indians in 1638 would constitute a slight increase over the 34,650 souls that were reported by Father Zarate Salmeron about 1626 (Salmeron 1966:35). It would appear that New Mexico enjoyed the same respite from disease as occurred in southwestern Mexico. Recall that the Jesuits also reported a slight increase in the mission population of northwestern Mexico from 1624 to 1638, despite very dramatic increases in the number of Indians baptized.

In New Mexico, as in northern Mexico, the native population declined precipitously after 1638. Between 1638 and 1660 the population was reduced by 42 percent to approximately 24,000 (Vetancurt 1961:269).10

In keeping with the general rate of decline, individual groups such as Zuni declined from perhaps 6,000 to around 2,500 (Woodbury 1979:471). By the time of the Pueblo Revolt in 1680, the population of both the Eastern and Western Pueblos had been reduced further to around 17,000 (Simmons 1979:186). The population, in effect, declined by over 80 percent between 1608 and 1680. As we have seen, this is precisely what happened to many native groups in northwestern Mexico.

Other parallels can be drawn between the Tarahumara and Hopi. During the decades following the Pueblo Revolt, the Hopi rebounded significantly, increasing to over 10,000 by 1742 (Hackett 1937:31). This

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9 Vetancurt's statement appears to be supported by archaeological research, which indicates there were fourteen Hopi villages during the sixteenth century, ranging in size from around 100 to over 1,000 residents (Adams 1981:342).

10 Vetancurt commented that a general census conducted in 1660 showed the Custodia of New Mexico had a population of around 24,000, including young as well as old people and Indians as well as Spanish. According to Dozier (1970:52), the non-Pueblo population never exceeded 3,000 during the seventeenth century.
recovery was due in part to the assimilation of what may have been several thousand refugees from the Eastern Pueblos. Perhaps more important was the Hopi's hostility toward and avoidance of Spaniards and other groups in the region. As reflected in the disappearance of Spanish vessel forms and designs borrowed by the Hopi prior to the Pueblo Revolt (Adams 1981:325–26), Hopi efforts to insulate themselves—like the Tarahumara's retreat to the Sierra Madre and their unusual distance-maintaining behaviors—presumably limited exposure to disease. Accordingly, the Hopi increased in number while the Eastern Pueblos suffered further losses from disease.

Burial books indicate that the Eastern Pueblos, such as Pecos, experienced a major epidemic during every decade of the period from 1695 to 1828 (Kessell 1979:378). During one such epidemic, in 1780–81, smallpox appeared in New Mexico about the same time it ravaged Sonora and Baja California, having previously worked its way northward from Mexico City. The governor of New Mexico estimated that over 5,000 natives died in the province. Individual Pueblos such as San Juan lost a third of their population, principally those under age fifteen (Abert et al. 1940). Other Pueblos including Pecos, Santo Domingo, and even the Hopi were devastated by this epidemic (Kessell 1979:348; Simmons 1966). Almost a decade after the epidemic, in 1789, the Eastern Pueblo population and Zuni numbered around 8,300 (Simmons 1979:183).

THE PIMA ALTO

The Pima Alto of northwestern Sonora and southern Arizona are similar to the Pueblos in that they have been the focus of considerable research. However, with few exceptions, most notably Dobyns (1963, 1966), researchers largely have ignored the impact of European-introduced diseases. This neglect is due in part to a paucity of documents from the seventeenth century. It was not until the end of the 1600s that the Jesuits extended the mission frontier northward into the Pimería Alta, generating reports and correspondence with extensive observations on the native population.

In the relative absence of material from the seventeenth century, historians and anthropologists have tended to assume that the history of the Pimería Alta begins at around A.D. 1700. Some have even suggested that the Gila River Pima were not exposed to Old World diseases until this late date (Meister 1976). We know for a fact that the Himeri were affected by disease at least as early as the 1650s.

As we have seen, both the Eastern and Western Pueblos were affected by Old World diseases by 1630, if not earlier. There are considerable archaeological and historical data, including the account of Fray Marcos de Niza, that indicate that the Pima Alto regularly traveled to Zuni and the Hopi mesas to trade. It is further apparent from Father Luis Velarde's description of the Pимерия Alta, written in 1716, that this trade continued well into the fourteenth century. Velarde noted that some "old Pima" related how the Sobaipuri and Hopi regularly held (trade) fairs, but that these fairs ceased after the Hopi invaded Sobaipuri territory and were soundly defeated by the Pima, who at that time "were a multitude" (Burton 1971:656). Conceivably, Pima attending these fairs acquired infectious diseases from their Pueblo trade partners. Fairs held between 1636 and 1638, when smallpox and other maladies raged on and off again among the Pueblos, would have offered an excellent opportunity for the spread of disease.

Of course, there were numerous opportunities for the Pima Alto to acquire infectious diseases from their Pima Bajo and Opata neighbors. As we have seen, the Pima Bajo were affected by Old World diseases as early as 1614. Logic dictates that at least some disease episodes that affected the Pima Bajo and Opata during the period from 1623 to 1693 also spread throughout the Pimería Alta. There are tantalizing bits of evidence to support this inference, such as a report from 1678 from the partido of Huépac that notes that two Himeri women, a mother and daughter, had traveled from "their own land" to petition for baptism. The daughter appeared to have been sick, as she died three days after being baptized (AGN 1678b).

During the second half of the seventeenth century the Pima Alto also had extensive contacts with Spanish miners at Bacanuchi along the upper Río Sonora, which provided additional opportunities for exposure to disease. Many Pima Alto bartered dried meat, tallow, corn, and livestock for clothing, tools, medicine, and other items offered by the Spaniards. It is significant that in 1704 alone, traders on the frontier exchanged $4,000 worth of medicines with the Pima (DíPeso 1953:34; Decorete 1941:II, 410–11).

In general, there were many opportunities for the spread of disease to and among the Pima Alto during the decades preceding Kino's arrival in Sonora. This possibility was acknowledged by DíPeso in his report on archaeological excavations at the Pima settlement and later mission site of San Cayetano del Tumacácori. Interestingly, DíPeso's (1956:148) work at the site led him to conclude that San Cayetano grew considerably during the late prehistoric and early historic period, and at its height
had twenty or more compound units, each with six houses. If we assume that five of the six houses in each compound were residential units with an average of five members, the total population of San Cayetano would have been around 500. When Kino and Salvatierra visited San Cayetano for the first time in 1691, they reported seeing more than forty houses built close together, with what may have been a population of 200 (DiPeso 1956:36. 44). San Cayetano, and presumably other Pima Alto settlements, may well have lost upwards of half their population prior to missionization.

Confounding our understanding of the extent and rate of population decline in the Pimería Alta are the varying estimates of the Pima population at the time of missionization. Father Kino, for example, estimated there were 6,000 Pima living along the Santa Cruz River in 1697, yet three years later he reported only 3,000 (Sauer 1935:31). The village of San Cayetano, which Kino and Salvatierra reported had forty houses in 1691, was visited by Kino and Manje six years later. At this time, Manje reported that San Cayetano had thirty houses and 150 people. These differing house counts and population figures probably reflect ongoing population losses from disease, particularly chronic infectious maladies, which appear to have been quite common during the closing decade of the seventeenth century.

In 1693, a year before Kino and Manje undertook their first expedition together among the Pima Alto, Nueva Vizcaya experienced an epidemic of what appears to have been malaria, typhus, and/or yellow fever, which reportedly destroyed one third of the native population. Although it is unknown if the epidemic affected the Pimería Alta, Manje’s diary of his travels with Kino in 1694—six to twelve months after the epidemic—contains numerous references to infants and adults who were sick and in danger of dying, as well as an aside regarding a twelve-day bout Manje himself had with "un fuerte tabardillo y ardiente calentura" (Burrus 1971:290–305). In an account of his fourth journey with Kino several years later in 1697, Manje also alluded to significant disease-induced population losses among the Jocomes. Specifically, Manje noted that he and Kino were visited at the Pima settlement of Ojio by several Sobaipuri chiefs and eighty-one of their followers from the villages of Bussac and Tubo. The chiefs cited in their discussions with the Spaniards that they currently were at war with only the Apache and that their former enemies, the Jocomes, "were now few in number and their chief [also] had died from disease" (Burrus 1971:367).

One cannot help but be impressed with the number of references to individuals who were ill in Kino’s memoirs or Manje’s journals. And yet, neither Kino nor Manje explicitly reported epidemics. Manje did, however, acknowledge that Sonora lost over 90 percent of its population prior to 1706. Statements by Kino to the effect that the average Pima household had 3.3 members also point to significant disease-induced reductions in population (Bolton 1948:1. 206).

With respect to population, Kino (Bolton 1948:II, 164) noted in 1696 that “it is a very well established fact” that the Pimería Alta had more than fifteen thousand souls. Manje noted in 1702 that his own census indicated that the Pima numbered more than 16,000 (Burrus 1971:49). Presumably neither Kino nor Manje included the Papaguaría in their estimates. Although Sauer (1935:32) has suggested that there were 10,000 Pápago in circa 1700, a figure of 8,000 is more in keeping with Manje’s and Kino’s accounts of their first three journeys, which covered the Papaguaría. Their comments further suggest that there were around 2,175 Gila River Pima in circa 1700, another 2,600 Pima along the Río Santa Cruz, between San Xavier and slightly north of Tucson, and somewhere between 1,160 and 2,500 Sobaipuri Pima along the Río San Pedro. The remaining 10,000 or so Pima were divided among the Hímeri, who were concentrated along the upper San Miguel and Magdalena river valleys, and the Sobas or Huatock Anuutam, who dwelled along the lower Río Concepción and in the desert country to the north and south (Burrus 1965, 1971; Doelle 1981; Bolton 1948).

As shown in Table 12, the Pima Alto population is thought to have numbered around 23,000 in 1700. If, as suggested, the Pima Alto weathered at least several epidemics prior to this date, their aboriginal population (A.D. 1500) may well have exceeded 50,000. This number probably was reduced by a third during the epidemics of 1623–25. Like their neighbors, the Opata of Sonora, the Pima Alto probably recouped 10 percent of their population during the years from 1626 to 1638. As a consequence of repeated exposure to disease between 1638 and 1700, the Pima Alto are thought to have declined further to around 23,000.

The Pima Alto population was again cut by over half between 1700 and 1730, largely as a result of what Father Velarde observed were "continuous epidemics" (Burrus 1971:654. 671; see also Alegre 1959:505–7; DHM 1730). In 1730 there were approximately 2,216 Hímeri and Sobas in the missions of Dolores, San Ignacio, Tubac, and Caborca.11 It is not known how the Pápago or the Pima in southern Arizona fared

11 The Estado indicates that there were 1,490 "almas capaces de administración" in the four missions. It was assumed that these "souls" were adults over the age of thirteen or fifteen, and constituted 67 percent of the total population.
between 1716 and 1730, as the death of Father Kino in 1711 and a shortage of Jesuits limited the priests' contacts with the Pima Alto beyond the present-day U.S.-Mexican border. In 1764, there were between 800 and 1,000 Pima Alto in the Himeri and Soba missions of the Altar-Magdalena River drainage. There were apparently 4,936 Pima Alto in Arizona, including 2,000 Sobaipiri who were forcibly relocated from the Río San Pedro and settled among their relatives along the Santa Cruz (Doby 1976:20–21).

Although the Pima population declined further during the remainder of the eighteenth century (Doby 1963: Kessell 1976:246; Rading 1979:73), it is unclear if Old World diseases or Apache raids largely were responsible for additional losses (Treat 1949:264). Also, the continued decline in the Pima population was paralleled by an increase in “gente de razón,” Pima and other Indians who were living outside the missions and who emulated Spaniards in many of their behaviors. In any case, it is clear that the Pima Alto were not spared the ravages of disease.

Patterns and Reasons for Decline

If we step back for a moment and reflect on the evidence presented above, certain patterns emerge that are of general significance. Predictably, native populations in those areas that were first settled by Spaniards and consequently were linked to central Mexico, experienced the earliest and some of the most dramatic reductions in population. The Tarahumara and Paoté of coastal Nayarit and southern Sinaloa and the Zacatecas along the eastern slopes of the Sierra Madre in Durango and Zacatecas were largely destroyed by 1590. As a result of the regular movement of goods, people, and disease agents northward along the Camino Real to the mining frontier, the Tepehuán, Acahualtepec, and Iria were also affected. Other sereno groups also experienced significant disease-induced reductions in population prior to 1590. It has been suggested that these losses were of a magnitude of 50 percent or more.

With the arrival of the Jesuits in the north and the erection of a vast mission system, native populations that had limited or no exposure to disease were repeatedly subjected to the ravages of smallpox and other maladies. Along the eastern slopes of the Sierra Madre and in the mountains about Topía and San Andrés, where miners, merchants, and mestizos already came and went with regularity, the Tepehuán, Acahualtepec, and Iria were reduced by over 90 percent prior to 1625. There was still a sizeable native population along the Pacific slopes of the Sierras in 1625, reflecting the fact that Old World diseases did not penetrate northern Sinaloa and Sonora until after the Jesuits arrived in 1591. However, there as in New Mexico, the native population was reduced by 90 percent by the turn of the eighteenth century. Although direct evidence is lacking, presumably at the same time the Yaqui, Pima Bajo, and Opatá declined in number, the Pima Alto sustained significant if not comparable losses.

As indicated in Figure 30, the precipitous decline in the native population of northwestern New Mexico parallels demographic trends in Peru and central Mexico (Borah and Cook 1963; N. D. Cook 1981; Cook and Borah 1960; Cook and Simpson 1948; Gibson 1964:138). Not surprisingly, the point at which most native populations in northwestern Mexico began to rebound came rather late, about 1750, almost a century after the nadir in central Mexico and Peru. This difference in timing reflects the fact that most groups in northwestern New Spain were unaffected by disease until after 1590.

In Mesoamerica, Peru, and northwestern Mexico the most dramatic population losses occurred during the decades preceding and immediately following sustained contact with Spaniards. In Mesoamerica and northwestern Mexico this initial period of contact shock spanned thirty to forty years and was followed by a brief respite from devastating epidemics. In central Mexico this break occurred between 1550 and 1575; northwestern Mexico and apparently New Mexico as well largely spared the ravages of disease between 1626 and 1636. After this lull, both regions again experienced another round of major epidemics, which over time became less severe as communities acquired more and more resistance to disease.

Recurrent bouts with disease not only claimed lives, but preempted marriages and conceptions, consequently lowering fertility rates (Johanson 1982:142; Wrigley 1969:13). In northwestern Mexico the birthrate varied in both time and space, depending on various factors, including how much time had elapsed since the last epidemic. During the years from 1632 to 1638, when northwestern New Spain was relatively free of disease and enjoyed good harvests, 13,956 infants were baptized in the entire restoado of San Ignacio, which at this time included the Yaqui, Mayo, Tepehuán, Néhuéme, Sauharia, Batucos, Aybinos, and Utes (AGN 1637: 1639). The fragmental history indicates that the missions of San Ignacio had 13,300 vecinos, with an estimated total population of 65,170. Accordingly, the population of San Ignacio averaged 31 births per 1,000 from 1632 to 1638. This is a reasonably high crude birthrate for preindustrial societies, particularly those reeling from decades of disease (Wrigley
which affected the entire province of Sinaloa. Figures supplied by Father Augustín de Guzmán indicate 695 infants were born in 1650 to the Mayo and Yaqui, who numbered around 25,000. The crude birthrate was, thus, 28 births per 1,000—a significant drop from the average of 31 births per 1,000 during the years 1632 to 1637.

The crude birthrate presumably dropped further in 1654–55, when many Mayo and Yaqui abandoned their missions, making it impossible for the Jesuits to report on baptisms (AGN 1653:380). Significantly, in 1657 Father Juan de Cueva reported that the past year and a half had been largely free of disease with bountiful rains and crops, and that 1,000 infants had been baptized that year (1657) in the reconstituted Mayo and Yaqui missions of San Ignacio (AGN 1657). The crude birthrate, in effect, increased from 28 per 1,000 in 1653 to 44 births per 1,000 in 1657.

A figure of 44 births per 1,000 is very high, but was not uncommon following disease episodes. In 1646, a year after Sonora and other areas of northwestern Mexico were affected by an epidemic, communities like Baviacora in the Sonora Valley had a crude birthrate of 48 per 1,000.

The crude birthrate among the Barucos and Ayvino was 41 and 42 births per 1,000, respectively. These are fairly high rates and undoubtedly reflect an eagerness to replace infants and children who perished during recent disease episodes. In 1646, only 73 percent of Baruco households and only 67 percent of Ayvino households included children of doctrine, ages five to twelve. In Baviacora each household averaged one child over the age of four (AGN 1646).

The depopulation that most native peoples experienced in northwestern New Spain was more the result of high infant and child mortality rates than a low fertility rate. This also was the case in central Mexico, where upwards of half the children born alive during the colonial period died during their first year of life; close to three quarters died in infancy (Gibson 1964:141–42). In northwestern New Spain the infant mortality rate varied from year to year and from one settlement to another, depending on the currency of disease and how often a community had been exposed to different maladies. Initial encounters with

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12 It is estimated (Tables 5 and 6) that there were 22,869 Mayo and Yaqui in 1656. A conservative estimate would be that several thousand people died in both missions between 1653 and 1656.
13 The puestos or yearly report from the missions of San Francisco Xavier indicated that there were forty infant baptisms or births in Baviacora, which had 200 families and an estimated population of 836, assuming a household size of 4.1 (AGN 1646).
14 The puestos de enano for 1646 indicated that 77 children were born to the Barucos and 114 to the Ayvinos (AGN 1646).
smallpox, measles, typhus, etc., often resulted in mortality rates in excess of 50 to 75 percent. Recall Father Tapia’s comment that two thirds of the children he had baptized died during the epidemic of 1593 (Shields 1934:142) or Father Julio Pasqual’s report that three quarters of the children in one instance and more than a third in another had died among the Chinipas prior to 1626 (AGN 1626:148-49). In a letter to the Spanish regent, Philip IV, Pérez de Ribas (1944:1 99-100) commented that “a good count” taken from Jesuit record books indicated that more than 40,000 infants had been baptized and died between 1593 and 1645 in northwestern Mexico.

During the late seventeenth and early eighteenth centuries infant and child mortality rates in northwestern New Spain abated for many groups, particularly those with a long history of exposure to disease. Reports submitted by mission superiors in Sonora provide a glimpse of infant mortality during the years 1716 to 1720 (Table 13). During this time many missions in northwestern Mexico were affected by an epidemic of what was at least in part smallpox. Significantly, data from over twenty-five communities in Sonora (Alegre 1959:491-518) indicate that, generally, the older a mission community, and the more it had been exposed to disease, the lower its infant mortality rate (Table 13). Because the mission frontier generally moved in a northerly direction over time, the mortality rates also exhibit a distinct spatial patterning, such that the oldest missions with the lowest rates generally are farthest south, while those with the highest rates are located farther to the north and to the east in the Sierras (Figure 31). The mortality rates range from a low of around 8 percent in the south at Tocoripa to a high of almost 60 percent at the mission of Bavispe, where baptism began in circa 1638, almost thirty years after Nébome contacts with the Jesuits.

It should be noted that high infant mortality was coincident with a higher mortality rate for women, particularly married women, relative to aboriginal conditions. As we have seen, the Jesuit annas frequently tell of women who suffered during pregnancy and childbirth from various maladies that often took the life of the mother and/or the child (e.g., AGN 1656:3). The risk of death for married women, particularly during pregnancy, is perhaps reflected in a report from the paroico of Bavisora from 1729 (AHH 1729). The report notes that the paroico suffered the previous year from an epidemic of measles. Interestingly, the two communities in the paroico (Bavisora, Aconchi) had significantly more adolescent girls than adolescent boys (twenty as compared with fifteen) and significantly more widowers than widows (twenty-five as compared with fifteen). What these figures suggest is that once a

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<th>NATIVE GROUP</th>
<th>Mission Contact</th>
<th>Total Families</th>
<th>Total Births</th>
<th>Total Deaths</th>
<th>Infant Mortality (%)</th>
<th>I.M. Avg. (%)</th>
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<td></td>
<td></td>
<td>GUASAVAS (Opata)</td>
<td>1638</td>
<td>Guasavas</td>
<td>46</td>
<td>64</td>
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<td></td>
<td></td>
<td>BASERAC (Opata)</td>
<td>1638</td>
<td>Biserac</td>
<td>148</td>
<td>177</td>
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<td></td>
<td></td>
<td>BASERAC (Opata)</td>
<td>1638</td>
<td>Bahiopue</td>
<td>129</td>
<td>101</td>
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<td></td>
<td></td>
<td>Guachimontes &amp; Zar.</td>
<td>70</td>
<td>73</td>
<td>37</td>
<td>50.7</td>
</tr>
</tbody>
</table>

Source: (Alegre 1960:491-518).
woman got married her chances of survival dropped appreciably, again, presumably because of the increased risks associated with pregnancy.

The premature death of married women is reflected in Pérez de Ribas's observation that many males objected to Jesuit insistence on monogamy because they feared they would end up as widowers (Pérez de Ribas 1944:II, 227). The high mortality rate among women apparently led to pressure for girls to marry at an early age. In the mid 1700s, Father Joseph Och observed that there were generally more men than women, in part because girls were married off much too early and often died with their first birth. Och further noted that he was often called upon to marry thirteen-year-old girls who bore children the following year (Treuerlein 1965:135).

The occurrence of major epidemics every five to eight years during much of the seventeenth century meant a high mortality rate among children aged four to twelve. Included in this cohort were children who were born since the last disease episode and infants who were breast-fed at the time of the last epidemic who benefited from maternal antibodies.

The susceptibility of children is reflected in reports from 1678 from the partido of Huépac, in the Río Sonora Valley, and Camupas, in the Río Montezuma Valley (AGN 1678a; 1678b). Reports covering the years 1675 to 1678 allow us to calculate the average yearly birthrate for each community and the projected number of children of doctrine, assuming all those who were born survived. A comparison of the projected number of children of doctrine with the number actually reported shows that the infant/child mortality rate in the five communities ranged from 37 to 59 percent. In four of the five communities over half those who were born died before they reached puberty (Table 14).

A comparison of the report mentioned above from the partido of Huépac from 1678 with a report from 1684 (AHH 1684b) indicates that the Opata settlements of Huépac and Banamichi lost 18 and 21 percent, respectively, of their noninfant population between 1678 and 1684. This decline is coincident with an epidemic that affected Sonora in 1680 (AHH 1684). Presumably, each family in Huépac and Banamichi lost a child with no history of exposure to disease.

The high mortality rates for infants, children, and pregnant women largely were responsible for the decrease in household size during the early historic period. Aboriginally, most native peoples in northwestern Mexico and the American Southwest apparently lived in households with a nuclear family of perhaps five or six (Beals 1932; Ortiz 1983; Sauer 1955). By 1638, the average household in Sonora and Sinaloa had not only decreased significantly in size (to 4.9), but the composition of
Table 14. Child Mortality in the Partidos of Huépac and Oposura, 1675 to 1678

<table>
<thead>
<tr>
<th>Location</th>
<th>Families</th>
<th>Births per Year</th>
<th>Children of Doctrine</th>
<th>Projected Deaths</th>
<th>Child Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huépac</td>
<td>60</td>
<td>24.0</td>
<td>101</td>
<td>216</td>
<td>53</td>
</tr>
<tr>
<td>Banámachi</td>
<td>71</td>
<td>17.3</td>
<td>98</td>
<td>156</td>
<td>37</td>
</tr>
<tr>
<td>Senequique</td>
<td>74</td>
<td>23.3</td>
<td>105</td>
<td>210</td>
<td>50</td>
</tr>
<tr>
<td>Oposura</td>
<td>256</td>
<td>46.0</td>
<td>245</td>
<td>414</td>
<td>40</td>
</tr>
<tr>
<td>Camapan</td>
<td>184</td>
<td>35.0</td>
<td>207</td>
<td>495</td>
<td>50</td>
</tr>
</tbody>
</table>

Sources and Notes. (AGN 1678a; 1678b). The projected number of deaths was calculated by multiplying the average number of births per year by nine. The latter number is the average of the number of years represented by the five to twelve age cohort among girls (8), and the five to fourteen age cohort among boys (9). The number of births per year is the average of the figures given for the three years covered by the reports.

the household necessarily changed. In 1638, many households must have included a husband and/or wife, one or two of their children, and one or more relatives (e.g., mother, aunt, cousin, nephew) who were left homeless by previous epidemics.

The size of the average household varied considerably during the remainder of the seventeenth and eighteenth centuries, again, depending on the recency of disease. However, the trend decidedly was in a downward direction until the late 1600s or early 1700s, when, depending on a group's particular disease history, it began to move higher.

Data from 1720, when many populations had stabilized or were rebounding, suggest that the average household had 4.2 members. Although the average in 1765 for 111 communities discussed by Bishop Tamarón y Romeral was only 3.2, this figure is misleading because, as the bishop himself noted, large numbers of adult males were working away from the missions. If these men who worked on Spanish farms and ranches were counted, the average household among groups such as the Yaqui probably would have numbered between five and six.

By the mid 1700s, then, the greatly reduced native population of northwestern Mexico was poised for recovery. During the late eighteenth and nineteenth centuries, groups such as the Yaqui, Tarahumara, and Pueblos continued to rebound both numerically as well as culturally. However, for the majority of native peoples, the losses sustained during the sixteenth and seventeenth centuries were irretrievable. This was true with respect to both population and cultural identity.

CHAPTER 5

CULTURE CHANGE AND THE DYNAMICS OF MISSIONIZATION

DISEASE-INDUCED CHANGES IN ABORIGINAL CULTURE

The unprecedented suffering and loss of life that many communities experienced during the years preceding and following missionization necessarily had an impact on aboriginal behaviors and beliefs. Nevertheless, the changes wrought by disease are not immediately apparent, inasmuch as pre-Jesuit epidemics and their consequences generally went unobserved and unrecorded by Spaniards. The extent of disease-induced changes is perhaps best reflected in the often incongruous descriptions of native life that were compiled by Spanish explorers between 1530 and 1565 and by the Jesuits in the late sixteenth and seventeenth centuries.

As discussed in chapter 2, the explorers' accounts indicate that many areas of northwestern Mexico, including the Sierras, were well populated. As late as 1591—but still before the introduction of Old World diseases in northern Sinaloa—the Jesuits learned there were more than 100,000 Cástas living in permanent villages along the Río Sinaloa, Río Fuerte, and Río Mayo. The explorers earlier reported villages and towns as well as rancherias in regions as varied as the Pimería Alta, the mountains about Topia, southern Sinaloa, Sonora, and the headwaters of the Río Conchos. In each of these regions native peoples invested considerable time and energy in the construction of palisades, defensive retreats, and stone or earthen-walled fortifications. We know as well from the archaeological record, the exploration chronicles, and early Jesuit observers that some Ayvino Opara, Acaxee, and Pima Alto enclosed their settlements with compound walls and constructed "grand houses" that apparently functioned as fortifications as well as communal storehouses.