



ON HORSEBACK THROUGH
THE DESERTS
OF LOWER CALIFORNIA

LECTURE NOTES BY EDWARD WILLIAM NELSON

FOREWORD

First and foremost, thank you so much for your support of the Baja Forever Campaign.

This book is our way of doing several things. On the one hand, it is a tangible reflection of our appreciation. But also, it is a delightful work from a time which was far less complex and far more innocent. It comes from an age when venturing into the unknown and bringing home knowledge and discovery were sufficient goals; when new recording technologies like film were celebrated. We didn't then think of threats, we were simply curious and imbued with a sense of wonder. To those who look back on such times with a sense of nostalgia, you cannot possibly be blamed.

However, these days are unequivocally over. Yes, we may still be curious but we are faced with challenges so huge that some have given up.

All that is especial and unique about Baja California is very much under threat. Under threat from ignorance, from greed, from short term thinking and from simple quirks of history. The thousands upon thousands of people who want to move to Baja California and retire along its coastline are not evil people, they just have resources and no cost-effective place to retire at home. The fishermen who overexploit the resource are not bad people, there are just more mouths to feed.

The key in our opinion is not nature versus people, but featuring an understanding that people depend on healthy natural systems. The aspirations of people will not be served by overex-

exploiting the natural resources. It is clearly the opposite—thoughtless development will destroy their future.

So we have an obligation and an opportunity to encourage a different vision for Baja California. One that respects the aspirations of its citizens and its visitors by protecting its unique assets.

You have, by supporting this campaign, given us hope, and again we thank you for that.

SVEN OLOF LINDBLAD
WALT REID
LORENZO ROSENZWEIG

FINDING TREASURE

It does not happen often, but one of the delightful benefits of growing older is the circumstance of seeing an action, made years before, circle back on itself.

In 1976 I drove across the United States with my daughter Erin to celebrate our country's 200th birthday in Washington D.C. So as not to waste the opportunity, I arranged to do some deep exploring in the catalogues of the Smithsonian Natural History Museum by volunteering to search the archives for mammal specimens collected in the Mexican state of Colima. The Smithsonian was only just then transferring their written records to a digital format so my task would mean searching card by card for the specimens and then going to the actual specimen to collect the specific data. The previous year I had spent two months in Colima as part of a team from the Los Angeles County Natural History Museum collecting mammals, primarily bats, at various elevations. The museum already had a large collection from the area dating back to the early 1900s and the intent of our expedition was to fill in our knowledge of chiropteran diversity as the countryside was rapidly being converted to agricultural fields. I anticipated spending more time wandering the exhibit halls than the accession cards. How wrong I was. I was unable to pull myself from the cards and later the original ledgers which noted every specimen, including human, submitted to the museum.

What was #1, the first specimen ever sent to the museum? My memory flashes a jackrabbit sent in by either Lewis or Clark. For many years the San Diego Natural History Museum

was mammologist Dr. Ray Gilmore's home. I found accession cards from his early work in Brazil and Alaska. And I found the cards for material sent in by Nelson and Goldman from Colima. And they had collected more widely, not just from Colima, so I also began to follow their spectacular careers.

One afternoon, to stretch my legs, I took the suggestion to visit the Archives for additional materials, such as the original field notes filed by Nelson and Goldman along with their specimens. These notes had become part of their publications so the data would not be new but I liked the idea of looking at the notes written under field conditions I might recognize. While there, the gentleman at the desk asked if I would also like to see the material from Baja California, Mexico. By then I had been traveling on the Baja peninsula for 10 years, so I eagerly said yes. Trapped again. I spent hours looking through boxes of pictures, field notes, and diaries. I recognized photographs from the Sierras and desert areas I had visited. I have never lost that feeling of finding treasure.

I banked this treasure in my memory and over the years tried to interest researchers and more recently the San Diego Natural History Museum in doing something with this remarkable original accumulation of experiences from a hundred years ago. Fortunately one of the listeners to my tale was Exequiel Ezcurra, who was able to take this next step.

For me this book is not the final closing on my leg stretching expedition 31 years ago. Today I am the Program Coordinator for the Mojave Desert Land Trust and our work, along with land trusts nationwide, is to preserve lands for conservation, in perpetuity. None of us, including the IRS, which monitors the effec-

tiveness of our transactions over time, has experienced *perpetuity*. Nonetheless, we go forward as if we knew. We fulfill our mission through the acquisition of land (outright purchase or through conservation easements) and stewardship. Stewardship includes monitoring the land once a year and maintaining a written and photo log to track changes, if any.

Since 2006, and through 2009, we are funded to acquire inholdings (privately owned land) within the desert national parks—Joshua Tree and Death Valley National Parks, and the Mojave National Preserve. We anticipate at least 6,500 acres will be purchased. After acquisition, the parcels are gifted to the National Park Service with the standard deed restriction that these properties must be maintained for their conservation values. The Parks will manage the lands but the land trust is required to steward the deed restrictions. To do this we are training a corp of volunteer stewards who will take their GPS units, digital cameras and notebooks into the field to record the stories of each individual parcel—forever. It gets better. By taking additional photos in a circle around each permanently marked photo point and filling out wildlife observation cards for the jackrabbits, ground squirrels, and lizards seen, our efforts will become part of a larger desert national park data base tracking habitat with climate change. Our records will be particularly valuable because the parcels are frequently in isolated areas that are infrequently visited by park staff. These archives will be a growing treasure, which I am helping to create. Making treasure, that's closure that feels more like a beginning.

PAT FLANAGAN

TREASURE FOUND

In early 1905, the U.S. Biological Survey decided to organize a reconnaissance of the peninsula of Lower California, and put the biologist Edward William Nelson in charge of the enterprise, with Mr. Edward Alphonso Goldman as field assistant. The expedition began in March, 1905, when Goldman joined D.T. MacDougal, botanist of the Carnegie Institution of Washington, on a boat expedition of the Colorado River delta. Goldman then traveled to San Diego, where he joined Nelson at the San Diego Natural History Museum, and on May 14, 1905, they both started their joint scientific adventure with a boat expedition to the Coronado Islands south of the Mexican border. Two days later, on May 16, they left San Diego by steamer to Ensenada, where their true adventure on horseback began. After 10 months of hard work, making detailed observations on the natural history of the peninsula and collecting myriad plants and animals for the Smithsonian, their overland exploration ended in La Paz on February 15, 1906, when the two expeditionaries sailed on a steamer for Ensenada. From there, they both traveled separately back to San Diego still collecting and taking notes and, finally, on March 1st, they both got together again in San Diego, where the expedition officially ended.

The detailed notes of the expedition were published by Nelson fifteen years later, in a wonderful report entitled "Lower California and its Natural Resources" (*Memoirs of the National Academy of Sciences* Volume XI, First Memoir, 1921, pp. 1–194). This book, together with Goldman's detailed synthesis of their

joint work in Mexico published in 1951 (“Biological Investigations in Mexico,” *Smithsonian Miscellaneous Collections*, Vol. 115, 476 pp., Washington, D.C.) has become a milestone research volume for anyone interested in the natural history and the environment of the Baja California peninsula.

Although I had known Nelson’s book for decades, it was until 1999 that Patricia Flanagan, a lifelong conservationist and environmental educator, and one of the most knowledgeable persons on the natural history of the deserts of northwestern Mexico and southwestern U.S., drew my attention to the little known fact that Nelson and Goldman’s glass plate photographs were archived at the Smithsonian Institution in Washington, D.C. Some five years later, in 2004, I was in D.C. for a few days, and unexpectedly had a free afternoon in the middle of an otherwise very busy meeting schedule. I called my friend Lenny Hirsch, at the Smithsonian, and he immediately arranged for me to visit the National Archives and inspect the contents of a series of 50 boxes catalogued as “Record Unit 7364 — Edward William Nelson and Edward Alphonso Goldman Collection, *circa* 1873-1946 and undated”. And, indeed, amidst an incredible rich collection of photos and documents of Mexico in the early 1900s, I found the photo album and the glass plate images of their expedition to Baja California in 1905–1906.

But that was not all. Among a series of other documents, I also found an unpublished manuscript by Nelson, titled “On horseback through the deserts of Baja California.” After some detailed reading of the old, yellowed pages, I realized it was a series of lecture notes for a slide presentation of the glass plate images. Nelson himself had carefully marked on the manuscript

margins the slide numbers that corresponded to each part of the lecture. Although it was clear that Nelson never intended the manuscript to be published, as it does not contain any significant information that was not included in his “Lower California” book, the old typewritten pages exerted on me the mesmerizing fascination of an old message in a bottle. It was, in a way, as if Nelson was giving me his old slide lecture again. Almost a century after their incredible horseback expedition, there I was, looking at an informal, entertaining narrative of the trip, intended more for a general audience than for a scientific publication. And at that point I decided that Nelson’s lecture notes had to be published together with his slides.

The rest followed quickly. The Gulf of California Conservation Fund generously granted the resources for the editorial work. The researchers at the Smithsonian Institution kindly provided their wholehearted support, help and advice during the complex process of digitization: Tammy Peters and Ellen Alers, from the Smithsonian Archives, Robert Leopold, Becky Malinsky, and Stephanie Ogeneski, from the National Anthropological Archives, as well as Jane Walsh from the Department of Anthropology, they all worked tirelessly in support of the project. Jon Rebman, Curator of Botany at the San Diego Natural History Museum, and Eric Mellink, a dear friend and colleague from the *Centro de Investigación Científica y Educación Superior de Ensenada* (CICESE), collaborated enthusiastically with the research for the notes to the text. Miguel Ángel de la Cueva contributed his immense artistic talent to the modern re-shooting of some of the images in selected sites. Ana Ezcurra, my daughter, directed the editorial work, while Pedro Ezcurra, my son, did the transcription

and final copyediting of Nelson's original texts. It was marvelous to be able to work creatively with my own family for this project. The whole collection, text and images, provides an immensely valuable resource for future studies of long-term environmental change, and has been deposited at the San Diego Natural History Museum's archives for any researcher interested in understanding the complex ways through which our own species has affected the environments of this beautiful peninsula.

I edited the book with the intention of giving the reader a similar feeling to what a member of the audience in a lecture hall at the Smithsonian in 1908 might have felt. We have respected Nelson's choice of images, and we have maintained his original text to the letter, even with a few typos he committed on the Spanish names of sites and places. Together with Jon Rebman and Eric Mellink, we added some notes here and there, clarifying some points, adding historic perspective, or inserting modern information for comparison purposes or simply to highlight Nelson's incredible scientific insight.

I really hope that through these pages the reader may get the same feeling of wonder and adventure that I got that day of November 2004 when I first visited the Smithsonian Archives and saw the amazing photos and documents of the Lower California expedition. It is a collection of immense importance for understanding environmental change in our region, and ultimately to envision what the future holds in stock for this unique part of the world. Brilliant and powerful, Nelson's legacy still rides strong through the deserts of Lower California.

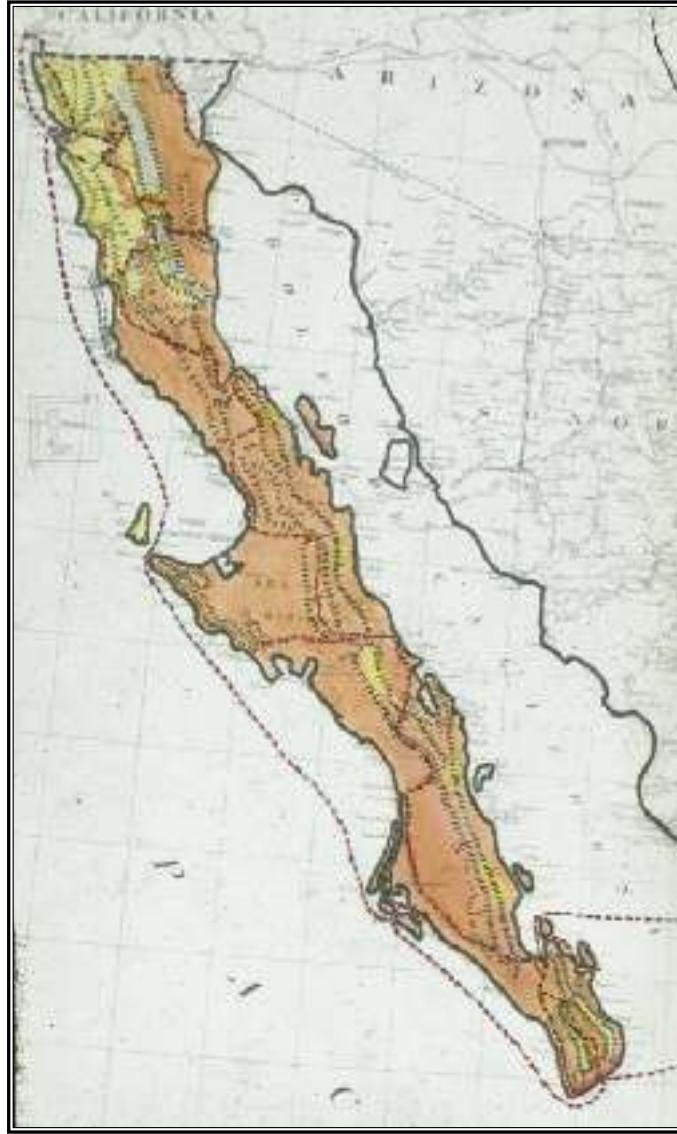
EXEQUIEL EZCURRA

The Peninsula of Lower California projects from the mainland like a long index finger pointing southeasterly into the Pacific Ocean (see map on p. ?). It was not known to Europeans until 1534 when the Spaniards had completed their conquest on the mainland of Mexico and began to look for new regions to conquer.

A year later Cortez landed near the southern end and established the first colony there. Cortez believed it to be an island and in order to encourage his followers assured them that they had reached the Island of California—a place of fabulous riches—supposed in those days to lie just off the coast of India¹. In this manner the name California became fixed to the peninsula and afterward was extended northward over a much greater territory. The only reward gained by the conqueror for his visit to these shores was the bestowal of his name on what we know as the Gulf of California, but which on Spanish and Mexican maps still is commonly called the Sea of Cortez.

Lower California is mainly a mountainous desert with desert plains in the extreme northeastern corner and also along an irregular coastal belt bordering the west shore. The climate is extremely arid and periods of from 3 to 5 years occur when there is not rainfall enough to start the desert herbage. As a consequence water is very scarce and limited mainly to isolated waterholes in the rocks, or to springs from which small streams flow a short distance and then sink in the thirsty earth. In all its extended coast line of between 2 and 3 thousand miles only 4 or 5 small permanent streams reach the sea. There are intervals of hundreds of miles on both in which no permanent stream reaches the shore and fresh water can be found only by digging. Owing to the low temperature of the water of the Pacific and

¹ Indeed, Cortés sent the King of Spain a description of an island in western Mexico “very rich in pearls and gold” that was “inhabited only by women without any men.” The description had been given in turn to Cortés by his soldiers and was plagiarized from a novel of the late 15th Century, *Las Sergas del Esplandián* (“The exploits of Esplandián”), by Garcí Ordóñez de Montalvo. The book starts with the oft-quoted phrase “*Sabed que a la diestra mano de las Indias existe una isla llamada California...*” (“Know ye that at the right hand of the Indies there is an island named California...”). Having found an inhospitable region which they thought to be an island, the soldiers embellished their report with a fictitious account taken from an adventure novel, which Cortés, in turn, transmitted to the King. Nelson's text suggests that he was aware of the *Esplandián* novel and the charade that gave origin to the name.



Map. [For his lectures, Nelson drew and colored a glass-plate photo of a map to show their expedition routes in Baja California, including Edward Alphonso Goldman's excursion into the Cocopah region in the Colorado River Delta.]

the cool sea breezes that blow persistently from the northwest and western coast of the Peninsula is decidedly cooler than the eastern. The east side is not only much hotter but more arid, especially in the summer when the surface water in the Gulf becomes very warm.

During the long rainless periods the small desert herbage crumbles and is blown away leaving the ground between the larger woody and fleshy plants as bare as though swept, while many of the larger plants become dormant. Such prolonged dry periods result in the death by starvation of vast numbers of desert mammals. Following the dry periods come seasons of torrential rains, and the bare earth is covered as by magic with an abundance of flowering herbage while the trees and shrubs burst forth into foliage and bloom. Animal life increases with astonishing rapidity and within two years the country again swarms with desert mice of several kinds, kangaroo rats, rabbits and other small mammals. The alternations of long dry periods with short wet ones are in part accountable for the development on the Peninsula of the most wonderful desert flora of the world. In climatic and other physical features the northern third is a continuation of southern California. A low coast range rising from 1,000 to 4,000 feet extends southward along the Pacific for 80 or 100 miles and is paralleled inland by narrow valleys. Beyond the valleys rise the still higher mountains of the interior. Between the eastern base of this interior range and the northern end of the Gulf of California lies the southern part of the Colorado desert—low, arid and excessively hot. The high interior mountains form a narrow range about 150 miles long, extending southerly from the California border and separated

near the middle by the low San Matias Pass. The northern section rises from 4,000 to 6,000 feet and is known as the Laguna Hansen Mountains; the southern section with an altitude from 6,000 to over 10,000 feet, is known as the San Pedro Martir Mountains. These last are by far the highest and finest mountains on the Peninsula, and in winter are covered with snow which lies on the main peak till May.

These mountains also form the southern end of the Sierra Nevada System of California. Like the Sierra they are composed mainly of light colored granite; they have a gradual slope with foothills on the west and a bald rocky escarpment thousands of feet high rising abruptly from the desert on the east.

From the southern end of the San Pedro Martirs south to the vicinity of La Paz the mountains continue as a lower and more or less irregular and broader chain, with many broken spurs and ridges and occasional isolated peaks. They approach and often form the coast line of the Gulf and occupy most of the eastern half or two-thirds of the Peninsula. In a few places spurs reach the west coast but usually on that side there is a more or less well marked coastal plain of irregular width. From the California border to near La Paz the mountains slope abruptly to the east and gradually to the west. From the northern border to near the middle of the Peninsula they are mainly granite and thence south to near La Paz are almost wholly volcanic. The lowest break or pass in the mountains throughout the entire length of the Peninsula is near La Paz where the mountains descend to an elevated sloping plain about 1,500 feet above the sea. Owing to the peculiar lay of the land at this point several observers have stated that this low neck separating the country south of La Paz

from that to the north was less than two hundred feet in elevation. I shared that opinion until I crossed this pass and made actual observations with a barometer.

The volcanic mountains from the middle of the Peninsula South to La Paz have a long western slope covered with great beds of lava, and gashed with gigantic walled canyons from 1,000 to 3,000 feet deep. South of the low neck near La Paz the Cape of Laguna Mountains rise abruptly and cover most of the area to Cape St. Lucas. They have very steep slopes and reach altitudes of from 2,500 to over 6,000 feet and differ entirely in formation from the country immediately north. This part of the Peninsula has an island-like appearance and at one time apparently was cut off from the north by an arm of the sea². As already stated, the Peninsula is mainly a desert but the higher parts of the mountains in the north are covered with beautiful pine forest and the mountains of the Cape Region are capped with a scrubby growth of oaks and nut pines. In the lower areas the desert vegetation is often abundant, especially on the Pacific slope where it frequently becomes a forest of giant cactuses, yuccas, agaves, and other strange plants.

The mammals, birds, and plants of this entire region are much like those of southern California, but in the southern end or Cape Region are many plants, a few birds and a single mammal—a species of mouse which must have originated across the gulf on the Mexican mainland³. The high mountain group near the extreme southern end as already stated was probably at one time an island and separated as it is from the high country to the north by hundreds of miles of hot desert it still possesses an insular character so far as isolation of its animal and plant life is

² Using simply field observations and a robust scientific perception, Nelson made here some acute observations on the possibility of a hypothetical ancient seaway separating the Cape Region from the Sierra de la Giganta. Indeed, there is a marked discontinuity along the geological fault that separates both regions, reflected in both an abrupt geologic change—from lava to granite—and a sudden shift in species composition—from desert to dry tropics—that suggest a long evolutionary separation between the cape and the rest of the peninsula. Modern molecular DNA studies and geologic analyses have bolstered Nelson's insightful prediction.

³ *Oryzomys couesi*

concerned. This isolation has been long enough continued for the evolution of numerous peculiar geographic races of birds and mammals, but not long enough to produce a single strikingly distinct species. In the northern end, as would be expected, the animal and plant life is practically the same as that of southern California.

Owing to its desert character Lower California is very thinly peopled and enormous areas are uninhabited. The greater part of the inhabitants is in the Cape Region where the rains are most regular and thus render agriculture more successful. La Paz, where Cortez first landed, is the principal town and contains several thousand people. San José del Cabo and a few other places with one or two thousand people make up the larger towns. A limited number of small ranches and insignificant mining camps cover the rest. When the Spaniards first landed there was a considerable population of Indians. The large springs and other important watering places were soon seized by the new-comers and in the course of time the recurring periods of famine and lack of water aided in the rapid extermination of the Indians from the southern part of the Peninsula, and only a few hundred still remain in the northern sections. They are of a rather low type and are represented in the United States by tribes living in extreme southern California and Arizona. The present inhabitants, mainly Mexicans of mixed blood, are extremely ignorant and unenterprising—as it might be expected from their isolation and the poverty of their country.

For more than three hundred years the Peninsula remained to science practically and unknown land. At various times during the last fifty years naturalists have visited parts of it, but

up to the time of our recent expedition—which I am to give you an account of tonight—no comprehensive work covering the entire region had been undertaken. The object of our work was to make a rapid survey of the distribution of its animal and plant life in relation to that of California.

As a preliminary to the main work of the expedition my assistant, E. A. Goldman in company with Doctor MacDougal of the Carnegie Desert Botanical Laboratory set out from Yuma, Arizona in March 1905 and spent several weeks exploring the extreme northeastern corner of the Peninsula along the Colorado River and about the Cocopah Mountains. This section is a part of the Colorado Desert, the hottest and most arid of all the American deserts.

The melting snows of the Rocky Mountains cause the great spring floods in the Lower Colorado during which the river overflows its banks and covers large areas of the plains (see plate 1). Along the northeastern side of the Cocopah Mountains in April 1905 there was a broad flood plain covered with a network of channels and small lakes extending for many miles⁴.

The Cocopahs are typical barren desert mountains rising abruptly from the plain to an altitude of 3,000 feet (see plate 2). The steep rocky slopes have but a scant growth of vegetation and it is so thinly distributed that at a short distance it is invisible this giving an impression of even greater sterility than exists. Not a single spring exists on these mountains. Notwithstanding the scanty herbage and absence of water, Mountain Sheep⁵ make their homes on the sun-baked, inhospitable slopes, and various species of small mammals live among the rocks. Numerous small mammals such as pocket mice⁶, kangaroo rats⁷,

⁴ This lush landscape has forever changed, as the river flow virtually ceased when a series of dams were built along the watercourse—the first and foremost being the Hoover Dam—and desert land was converted to agriculture. The absence of freshwater flow into the northern Gulf of California has been blamed as the leading cause of many environmental problems, including the dramatic reduction of populations of the totoaba giant croaker (*Totoaba macdonaldi*) and the vaquita porpoise (*Phocoena sinus*), which is now in serious risk of extinction.

⁵ The bighorn (*Ovis canadensis*) is a prime trophy for American hunters, who flocked to the Cocopah Mountains at the turn of the 20th century. Unfortunately, the uncontrolled hunting extirpated the bighorn sheep from this range.

⁶ Possibly *Chaetodipus formosus*, *C. rudinoris*, and/or *C. spinatus*.

⁷ *Dipodomys merriami*, normally colonizing the sandier, softer soils.

and rabbits⁸ find shelter and are often very numerous among the bushes in the more fertile drainage hollows about the base of the mountains.

It is perhaps unknown to many people that a large number of the smaller kinds of desert mammals never drink water. They live and thrive on dry seeds and scraps of vegetation in places where the heat and aridity are excessive without ever touching their lips to a drop of moisture. It has been found impossible even to teach them to take water in captivity. Apparently they never know thirst or the delights of quenching it⁹. Large desert mammals such as rabbits and deer¹⁰ obtain sufficient moisture from eating the succulent parts of certain desert plants. I have come to solitary water holes in hot weather, a long day's March from any other water source, and found the loose earth about its borders undisturbed by tracks except those of birds, while within a few rods were the footprints where wandering deer had been feeding absolutely indifferent to the water.

On the plains not far from the Cocopahs are the so-called mud volcanoes of the Colorado Desert (see plate 3). These are low conical mounds of dried mud from 4 to 10 feet high with a tubular chimney in the middle through which the liquid, boiling mud slowly rises at intervals and overflows as shown in this view. Hundreds of these cones are scattered irregularly over a district several miles across.

The last of April Goldman joined me at San Diego, California and we went south 60 miles to the little Mexican port of Ensenada where we were to outfit and begin the serious work of the expedition.

Near one of the small islands off the coast from Ensenada on

a rocky pinnacle rising almost sheer from the sea a pair of Bald Eagles¹¹ were nesting (see plate 4). A single nearly grown young bird was in the nest and after some hard climbing we succeeded in getting to him. He received us with open mouth and threatening gestures, but after a time sat quietly for his picture.

At San Diego we had been assured that in Ensenada we could find an abundance of everything needed for the journey—a statement which proved to be largely a figure of speech. After considerable trouble, however, we managed to secure four saddle horses, four pack mules, and two Mexicans who claimed to know the country for several hundred miles, as packers and guides. These men, with Goldman and myself made up the part for the expedition.

While outfitting at Ensenada we were favored with the comments of a volunteer corps of advisers on the folly of such an attempt as we were planning. We were assured that no one had ever made such a journey. There were hundreds of miles of uninhabited, waterless desert to cross where there was no feed, and in addition to dying of thirst our animals would surely perish of starvation, while our own chances were scarcely worth mentioning. Besides all this, the wretched animals we had bought from those other people would not carry us a tenth of the way. Why had we not bought fine saddle animals from themselves? We were riding horses too and on the desert no one ever rode anything but mules. Notwithstanding these dismal predictions we finally started and for the next eight months traveled slowly down the Peninsula. During this long journey we followed little used trails or made our way across broad, trackless areas by means of the compass and such information

⁸ Both Cottontails (*Sylvilagus audubonii*) and Jackrabbits (*Lepus californicus*) are common here.

⁹ Nelson's observation is accurate and was proven by later research to be scientifically correct. In all animals, metabolism produces CO₂ and water as by-products of respiration. This "metabolic water," which is formed within the organism through the biochemical oxidation of sugars, is normally exhaled through the lungs, but many desert animals possess adaptations that reduce respiratory water loss, including modifications in the morphology of the nasal passages, the capacity to reabsorb water along the respiratory tract; and the ability to regulate body temperature without sweating or panting. Because many desert herbivores are normally very active foragers, they have a very high metabolism and produce large amounts of metabolic water that, in conjunction with water obtained from plant juices or from morning dew, allows them to survive for long periods in the desert without drinking and facing the ensuing risk of becoming an easy target for predators lurking around the water holes. One of the most extreme examples of the capacity to live without drinking water is given by the kangaroo rats, which can survive on a diet of perfectly dehydrated seeds.

¹⁰ Mule deer (*Odocoileus hemionus*).

¹¹ *Haliaeetus leucocephalus*.

about landmarks as we could gather from the people we found from time to time. With flour, dried deer meat and tea for provisions and a small tent for shelter when necessary we moved on from day to day with all the freedom of savages.

A waterhole in the rocks and some grass nearby for our animals, and a level spot free from cactuses where we could spread our blankets made a good camping place. At night the horses were hobbled and turned loose with the absolute certainty that they could be trailed among the thorny forest in the morning and found within a mile of camp.

We kept mainly along the mountainous interior where waterholes were reported to be more frequent than near the coast. The Peninsula is nearly 800 miles in length and varies from 30 to over 100 miles in width. In order to cover the country as thoroughly as possible we crossed it in a zig-zag course eight times from shore to shore. To accomplish this journey required over 2,000 miles of horseback travel, in addition to various boat trips to islands on both coasts. The knowledge of the country claimed by our guides proved to be mainly imaginary, and as a result, on several occasions, we were forced to risk our lives in crossing broad stretches of desert where the waterholes were thirty to fifty miles apart.

In making these long rides across the waterless plains in the intense heat our animals became much exhausted and suffered severely from thirst. We humans fared somewhat better, for each man carried on his saddle a canteen holding a gallon of water which was always used as sparingly as possible for fear of some unforeseen necessity. It was not possible to carry more water for the pack animals were always heavily loaded with our camp outfit

and the necessary provisions to serve through the wide uninhabited stretches. Under such circumstances, each journey of from one to two days of hard travel to a distant waterhole, which we must find from directions and descriptions of landmarks, became a serious undertaking. To miss one of these small reservoirs of water or to find one empty meant an unpleasant experience—such as the same individual rarely has the opportunity to repeat.

However, fortune was always with us and no mishaps occurred though we now and then had anxious moments. Bountiful rains had fallen all over the Peninsula the previous year and in consequence there was a fine growth of desert herbage¹². Among this our animals succeeded in finding enough feed to carry them through. The forage was sometimes a species of slender bunch-grass¹³ and sometimes the new growth on the branches of thorny bushes. It was interesting to see the skill with which our desert-reared animals, when turned loose, would go from bush to bush choosing the edible ones, in situations where stock raised under more civilized conditions would have promptly starved. With such feed it was impossible to travel long distances in a day, except when the need was urgent, and from 12 to 20 miles was an ordinary day's journey. During the intense heat of summer the longest journeys between waterholes—journeys sometimes of nearly two days duration—were made, when possible partly by moonlight in order to save the animals some of the suffering which always accompanies such long dry marches in the sun. Several times our stock became so exhausted that we had to camp for 10 or 15 days to allow them to rest, always choosing a place with reference to abundance of good feed. By this care we succeeded in taking all but two of the original ani-

¹² Indeed, late 1904 and early 1905 saw strong "El Niño" conditions in the Pacific Ocean, which brought abundant rains to the peninsula.

¹³ Most travelers in Baja California at that time used mules because it was thought that horses could not withstand the harshness of the environment, nor could they survive with the grasses found in the region. Nelson and Goldman's expedition showed that the trip could be made using horses. Although Nelson's description of the grasses upon which their animals fed is very cursory, the "slender bunch-grass" he mentions is probably *Sporobolus* (dropseed grasses or zacatón), but could also be *Aristida* (three-awn grasses) or *Muhlenbergia* (muhly grasses).

mals through the entire 2000 miles of mountainous desert. We often traveled for days without seeing a human being outside of our own party; and a distant horseman or the trail of a horse crossing the country, was always the subject of keen interest. Here and there we passed ruined huts and corrals, most of them dating back for years, in places where adventurous efforts had been made to establish ranches. With rare exceptions such attempts had succeeded only until the occurrence of the next series of rainless years when the stern desert conditions conquered and only these small and vanishing traces of human intruders were left.

Seaports along the coast are widely separated and in one instance we had to travel more than 500 miles before we could ship our accumulated stock of specimens and lay in new supplies. We usually counted on getting some of the main necessities at occasional mining camps located near the route. In this we were not always successful, and once found a camp absolutely deserted at a time when our supply of flour was reduced to less than five pounds, and all other provisions exhausted. This was an unpleasant discovery for it was nearly 200 miles back to the supply point from which we had come and over 250 miles to the next one in advance. Our party of four had before us the alternative of living several weeks on rabbits and such other small desert animals as we could kill, or of finding the people who had recently occupied the desert camp. We circled around the camp and soon found an old trail leading off among the hills in which were the most recent tracks, all leading away from camp. This we followed in its windings for hours under a scorching sun until to our joy after traveling about 20 miles we found the people we

were looking for camping on the shore of the Gulf. They were a party of Yaqui Indians in charge of a friendly English miner named Dick Daggett¹⁴. Fortunately he had a stock of supplies which had arrived by boat at ten o'clock the night before and were still piled on the beach, while every bean pot in camp was bubbling over the fire. Dick explained that they had starved out of the mining camp and has been living on the beach for 6 weeks subsisting on fish, turtle meat, and wild honey. He said that nothing in all his life had ever seemed so good in anticipation as his coming feast of boiled beans. We rejoiced with him and while we were renewing our supplies he insisted on giving us some bottles of wild honey which had been gathered by the Indians in the surrounding hills. Scores of wild bees¹⁵ were buzzing about a canvas water cooler hung in an open shed. They were thirstily sucking the moisture and then flying away over the cactus grown country. Dick said that his men followed the bees from this water and by baiting them with burning wax and honey managed to find many of their nests. Some of these were more than 8 miles away, and as the only surface water for many miles was at camp, the bees of the farther nests had to make a round trip of at least 16 miles for each drink.

At the eastern base of the San Pedro Martir Mountains we came to the first of the splendid growths of the desert plants (see plate 5). During the first part of our journey these were extremely interesting, but the endless repetition of thousands of the same stiff forms day after day for months in succession became very monotonous. The giant cactus in the middle is the most characteristic and abundant type of plant life in Lower California, and occurs in suitable localities from one end of the Peninsula to the other.

¹⁴ Richard Daggett was an Englishman from Oxford that arrived to Baja in the 1880s as a junior officer in a German merchant ship bringing bricks and machinery for the Las Flores gold mine in the Sierra de San Borja. Having quarreled with the boat's captain, he jumped ship and, guided by newly-made Mexican friends, hid in a cave until the boat left. He then got a job at the mine and married a young girl from San Ignacio. With time, Dick Daggett and his son Dick Jr. became true Baja California legends and founders of the town of Bahía de los Angeles. The fact that Nelson reports finding Daggett "camping on the shore of the Gulf" suggests that they met at Bahía San Luis Gonzaga, the place where, according to their map, they reached in the Gulf's Midriff coast during their trip.

¹⁵ Although 197 native bees have been recorded in the peninsula, none of the species in the middle portion produce honey. The "wild bees" observed by Nelson were in all likelihood the European Bee, *Apis mellifera*, introduced to northwestern Mexico and southwestern United States very soon after European contact.

As already stated the east side of the San Pedro Martir Mountains rises abruptly from the desert. In the present view the foreground on the plain is filled with creosote¹⁶ and other desert bushes (see plate 6). Back of this the mountains rise in a single great rocky slope to the crests over 5,000 feet above the plain. The slope is nearly bare granite but a thin fringe of pine trees grows among the summit. This view was taken near the point where we left the base of the mountains and crossed 35 miles of waterless plain to a reported waterhole on the shore of the Gulf of California. None of the party had ever been in this section before and we set forth with some misgivings as to the outcome. Some months before three prospectors had crossed the same route and the dim remains of the trail made by their mules was still visible in places and finally led us up the place. The water was in a shallow hole in a clay flat back from the beach and had a vile taste and odor, so that even the thirsty pack mules refused to touch it. Camp was made under the shade of a fine mesquite tree¹⁷ some distance away and we then proceeded to clean out the water hole. During these proceedings a coyote sat on a knoll just out of gunshot and howled dismally. After fresh water had filled the hole it could be used but still had a most peculiar taste that was far from appetizing. By noon the next day the water had again taken on its slimy greenish color with the original excessively offensive odor and taste. The following morning the delectable quality of the water was explained when I found it crowded with Turkey Buzzards¹⁸ taking a bath! Another cleaning of the hole was at once in order, after which it was covered with pieces of driftwood from the beach. The next morning I counted 18 buzzards sitting in a

¹⁶ *Larrea tridentata*.

¹⁷ *Prosopis glandulosa*.

¹⁸ Turkey Vultures (*Cathartes aura*).

dejected circle around the hole waiting for the cover to be removed so they might have their morning bath. On top of the San Pedro Martir Mountains, at an altitude of 6,000 to 8,000 feet, we found several beautiful little basin-like valleys with open parks bordered with pine forests (see plate 7).

The most graceful of all trees on the mountain is the sugar pine (shown in the middle of this photograph) which has such a distinctive growth that it may be known among other pine trees at a long distance (see plate 8). Here and there on cool north slopes are little groups of aspens and a few fir trees, and at the heads of sheltered canyons on the west slope were small groups of the noble Incense cedar¹⁹.

From the summit of the highest ridge at 9,000 feet, where on the eastern side the mountain drops away abruptly for nearly 8,000 feet to the desert, we had a wonderful outlook (see plate 9). At the foot of the mountain lay a yellow desert valley beyond which the eye had a clear sweep across the summits of succeeding ranges of desert mountains to the Gulf of California, and across it to the far off mountains of Sonora, while northward, over 100 miles away, the Colorado River could be seen like a narrow silver ribbon winding across the plain.

At 6,000 feet on the west slope lies La Grulla, the most beautiful valley on the mountains (see plate 10). The San Pedro Martirs are covered with a profusion of huge granite boulders frequently 15 or 20 feet in diameter. They are scattered everywhere and many gigantic ridges are made up of them standing out bare and cold against the sky without soil enough for trees or other vegetation to get a foothold. The handsome Mountain Quail²⁰ was abundant and tame, and at the time of our visit

¹⁹ Nelson's description of these high-altitude species shows that the expedition climbed all the way to the highest part of San Pedro Mártir. The trees in question are *Populus tremuloides* (Aspen), *Abies concolor* (White Fir), and *Calocedrus decurrens* (California Incense Cedar).

²⁰ *Oreortyx pictus*.

many pairs were leading broods of partly grown young about the wooded slopes. While at La Grulla we were fortunate enough to get our first California Condor²¹, a huge bird measuring about 10 feet across his outspread wings. They have wonderful hours of flight and I had a most enjoyable hour watching the evolutions of about a dozen of them as they swept back and forth over the tops of the pine trees or soared away toward the sky. When they alighted on a dead pine a Turkey Buzzard sitting nearby looked like a pigmy. The large wing quills of these gigantic birds are cut off and the hollow bases fitted with stoppers and used by the natives for carrying fine gold from the placer mines.

From the mountains we descended to the Pacific Coast and visited several small islands. On approaching the shore of San Martin Island our curiosity was aroused by curious white patches scattered everywhere over the dark lava slopes (see plate 11). These spots proved to be strange plants with velvety white leaves and long straggling flower stems.

On San Martin many Cormorants²² were breeding and families of young birds were still in the nests (see plate 12). While we wandered over the island we were always accompanied by an escort of Western Gulls²³ soaring low overhead. When a Cormorant flew away, leaving eggs exposed the gulls swooped down and either ate them at once or if alarmed at our approach each bird transfixing an egg on its beak and flew away draining the contents as it went. On two occasions I saw gulls alight on a nest and calmly pick up young Cormorants weighing 5 or 6 ounces and swallow them entire. The helpless victims were swallowed head foremost, their black feet kicking despairingly from the gull's widespread beak as they disappeared.

²¹ *Gymnogyps californianus*.

²² *Phalacrocorax auritus albocillatus*.

²³ *Larus occidentalis*.

A Fish Hawks' nest²⁴ containing at least a cart load of material was perched on a point of lava overlooking the sea, and as usual with these careless builders an equal quantity of waste material lay scattered on the ground (see plate 13). The contrast in the building sites chosen by this bird is shown by another nest in a giant cactus on Margarita Island, near the southern end of the Peninsula (see plate 14).

While camped on San Martin we skinned a couple of seals on the beach and a large number of Western Gulls congregated near by giving us an opportunity to photograph them (see plate 15). The beauty of these birds is apparent, but this is a case where beauty is only skin deep for, they are the worst of feathered pirates as I have just shown in describing their attacks on the Cormorant nests.

From El Rosario on the Coast our route led inland over barren coast hills. One day our interest was aroused by what appeared to be a thin forest of telegraph poles on the sky-line of a distant ridge. When we reached this we found the apparent telegraph poles were in reality representatives of a most striking type of plant life—the *Fouquieria columnaris*—a remarkable species peculiar to Lower California, where it forms forests over vast areas on the middle part of the Peninsula (see plate 16). The trunks of these trees are pale yellowish; they have small thorny branches and at the top a little tuft of stalks bearing small, pale yellow flowers. They are from twenty to over 50 feet high and the shape, color and small straggling branches of these trees suggest the idea of tall slender parsnips standing on their heads.

Young individuals are much more heavily branched than the old ones (see plate 17), the long branches being replaced with

²⁴ Ospreys (*Pandion haliaetus*).

short ones in adult trees. The large dead trunks of old trees are hollow and are favorite places for wild bees which have escaped from California and spread south for hundreds of miles on the deserts.

In many places where we first encountered this forest (see plate 18) it is mixed with agaves or other plants, and often becomes so thin that the country has a most desolate appearance. In such places the scattered plants serve only to increase the effect of wild loneliness (see plate 19).

Another species of *Fouquieria* (*Fouquieria splendens*) occurs with the single-trunked one, but has a very different appearance, consisting of a cluster of slender stems bearing at the top bright scarlet flowers which make brilliant spots of color (see plate 20). The well worn trail shown in this picture has been the regular route across the Peninsula ever since the Spaniards established their missions centuries ago. In this country with its broken plains covered with thorny plants and inhabited by hostile Indians, several of the old Spanish missionaries spent their lives and the record some of these men left fills one with wonder and admiration for their courage and devotion.

One day we came out on a bluff overlooking the Arroyo of Catavigna²⁵, a broad wash of white sand along which were patches of bright green willows and coarse grass and some of the most graceful palms I have ever seen (see plate 21). It was a complete surprise and we sat on our horses for a long time feasting our eyes on one of the most exquisite of the desert pictures. For days we had seen only the dull gray-green of the usual vegetation and our eyes were so refreshed and gladdened by the cool bright green along this empty water course that they seemed to fairly taste the richness of the color. Water was still near the sur-

²⁵ Spelled "Cataviña" in Spanish; apparently lacking the tilde in his typewriter, Nelson resorted to the Italian spelling "gn" to represent the "ñ" sound.

face and while walking through a thin patch of tall grass and willows I came across a solitary Virginia Rail²⁶. He was tip-toeing slyly ahead with an air of intense caution as though fearful of breaking the silence by a footfall. This encounter with the Rail, a common bird of the Potomac Marshes, in the heart of the desert was as pleasing a surprise as the palms.

The hills surrounding this palm-grown arroyo are thickly grown with giant cactus and *Fouquieria* with many smaller plants as a kind of undergrowth (see plate 22).

Although familiar with the varied types of plant life from the stunted growth of the Arctic tundras to the exuberant foliage of the humid tropics I have never seen such a fantastic riot of extraordinary forms as that afforded by the ordinary flora of the deserts in central Lower California (see plate 23). The combination of strange forms was often wonderfully picturesque and gave the landscape an individuality unlike anything to be found elsewhere in the world. These landscapes covered with fantastic vegetation seemed a fit abiding place for the curious animal life of an early geological age rather than the species of today. There appeared to be an endless variety of cactuses, the one shown here is common near the Gulf Coast (see plate 24). The short, many-branched type was abundant in both species and individuals and always associated with *Fouquieria splendens* (see plate 25). On the less fertile areas the larger plants are more widely scattered, travel was easier and we often traversed long distances without a trace of anyone having preceded us (see plate 26).

After our visit to Dick Daggett's camp on the shore of the Gulf, we struck inland again and when we came to the elevated interior, on the Pacific Slope, traveled for days through one of

²⁶ *Rallus limicola*.

the most exuberant growths of vegetation found on the entire strip (see plate 27). Here appeared to be common ground for almost every form of desert. Yuccas, agaves, cactuses of many species and two kinds of fouquierias made a vast forest through which our trail wound endlessly. Here we made two of our night marches to distant water holes. Riding silently for hours by the radiance of a brilliant moon among the unbroken succession of grotesque forms, with the hush of night over it all, we seemed to be tracking through the unreal world of a fantastic imagination.

After a dry camp in the forest we reached the Tinaja or water-hole of Yubay (see plate 28) where we camped for a couple of days to rest the stock and see what birds and mammals we could find. Desert bird life was fairly common, the most characteristic kinds being the Cape St. Lucas Blue Jay²⁷, the Gilded Flycatcher²⁸, the Ladder-backed Woodpecker²⁹, the Roadrunner³⁰, with some sparrows and gray thrushes. Whenever we came within three or four miles of a water hole we usually began to see California Quail³¹ and these increased in numbers as we neared the water. In this way we were sometimes assisted in locating waterholes. The Tinaja of Yubay was a sub-baked spot where a deep hole worn in the granite held a small pool of rain water eight or ten feet across.

Immediately about the camp the vegetation was different in character to that of the forest a few miles back. The low perennial herbs shown here are yellow flowered composites and at the time of our visit were just going to seed (see plate 29). During the stay here our horses and mules fed almost exclusively upon these, walking from plant to plant and nipping off all the seed tops. The rapid improvement of the condition of our animals

²⁷ *Aphelocoma californica hypoleuca*.

²⁸ Apparently a typing error for the Gilded Flicker, *Colaptes chrysoides*.

²⁹ *Picoides scalaris*.

³⁰ *Geococcyx californianus*.

³¹ *Callipepla californica*.

on this feed proved it to be equal to so much grain. Near this camp were a number of fine examples of *Dasyllirion*, a widely spread desert type distributed from Texas to the Peninsula (see plate 30).

Among all the many spring forms of vegetation encountered, one cactus seemed to be especially well protected (see plate 31). The botanists say this is probably an unknown species but we were out of its range before we realized that we had saved no specimens. In some parts of the central region are extensive forests consisting almost exclusively of a single species. The present view (see plate 32) shows a plain overgrown with a forest of century plants or agaves.

After passing the Agave forest we entered one of yuccas (see plate 33), which began near the Pacific coast and extended inland for many miles. In this we found a little known species of thrush to be common and very tame. During the cool freshness of dawn its sweet song was a delight to us but a little later the scorching sun soon stopped the music. Near the sea where the northwest winds have full sweep the yuccas become permanently contorted (see plate 34)³² so that even in a dead calm the forest gives one the impression of a strong breeze.

The only wagon road in central Lower California is one that leads from Santo Domingo Bay on the Pacific straight away to the small mining camp of Calmalli in the interior. We followed it to again reach the central trail. Near this road are some of the largest giant cactuses we have ever seen. The man on horseback is exactly the same distance from the camera as the cactus, thus affording a good idea of its comparative size (see plate 35). Throughout the district the vegetation is profuse and proves

³² Nelson attributes the southwards leaning of the yuccas to the effect of winds, but recent research has shown that other species of *Yucca* lean in this manner in areas without strong winds, suggesting that the south-leaning tilt of the stem may help the plant's leafy crown to act as a parabolic antenna maximizing photosynthesis in spring.

that the word desert does not necessarily mean barrenness; nor do periods of even 5 years without rain prohibit an abundant growth of vegetation after plants have learned to store up moisture or otherwise protect themselves (see plate 36). Another view of the same Santo Domingo plain shows still other plants, including the barrel cactus or viznaga of the Mexicans. When water fails, the juicy pulp of these plants has often saved the lives of desert wanderers (see plate 37).

We now entered the lava country where our first experience was a climb of over 1,000 feet up the steep side of San Pablo Canyon (see plate 38). Here living among the cactuses we were surprised and pleased to find a new species of striped-backed chipmunk³³ not very different from the familiar little animal of our eastern woods. The walls of this, as of all other canyons from here south to near La Paz, are of volcanic material, with a heavy cap, several hundred feet thick, of dark colored lava. Many of the canyons through the lava country were extremely beautiful and the deeper ones, with their frowning walls of dark lava often reach a height of from 2 to 3 thousand feet, were wonderfully impressive (see plate 39). This shows the Tinaja of San Juan, a very large water pocket in a lava bed (see plate 40). Quite a flock of coots³⁴ were living here though the surrounding country was excessively rocky and arid.

A few miles from Tinaja San Juan we came to San Ignacio, containing about 1,000 people and the largest town in the interior of the Peninsula (see plate 41). It is built in an oasis formed by a large spring which rises in the bottom of a broad canyon and supplies water enough to irrigate considerable land. This was the site of one of the largest missions and the mission

³³ *Tamias obscurus meridionalis*.

³⁴ American Coot, *Fulica americana*.

church built nearly two centuries ago stands well preserved today (see plate 42). In the southern half of the Peninsula, beginning with San Ignacio, a number of fine old mission churches still exist in fair condition.

The oasis of San Ignacio is a valley about half a mile wide and ten miles long (see plate 43). In this the padres planted a few date palms and some grapes. Through self seeding the palms have increased, until they are estimated to number from 50 to 60 thousand trees and afford the main support of the people³⁵. The ground is divided into many small date ranches like the one shown. The climate of San Ignacio is hot and dry so that the houses are of the most airy construction as is evident by an interior view (see plate 44).

The abundance of water and consequent growth of vegetation in the valley at San Ignacio makes it rich in birds and mammals. Here we found song sparrows³⁶, cardinals³⁷ and several kinds of doves³⁸ besides various ducks and other water birds. Pocket mice of three species³⁹, kangaroo rats⁴⁰ and other small desert rodents swarmed here beyond anything I have ever seen. They had great fun running over our beds at night and appeared to consider our faces parts of the scenery over which they chased one another until we were finally obliged to put up mosquito nets to keep them away.

From San Ignacio a side trip was made for antelope to a desert plain on the west. On the border of the plain far from any surface water was the well of San Angel surrounded by a picturesque group of date palms (see plate 45). Fifty miles away across a waterless desert in a canyon of the low coast mountains is the fine water pocket or Tinaja of Santa Clara (see plate 46), walled

³⁵ Even today, agriculture in San Ignacio is based on date palms and their products.

³⁶ An endemic subspecies, *Melospiza melodia rivularis*.

³⁷ Northern Cardinal, *Cardinalis cardinalis*.

³⁸ Three species have been documented in the area: White-winged Dove, *Zenaida asiatica*, Mourning Dove, *Zenaida macroura*, and Common Ground-Dove, *Columbina passerina*.

³⁹ *Chaetodipus arenarius*, *C. ruginosus*, and *C. spinatus*.

⁴⁰ *Dipodomys simulans* and *D. merriami* occur in the area.

in on three sides by inaccessible cliffs and like most such watering places without a sign of its presence until one suddenly comes upon it.

Throughout the central part of the Peninsula are curious dwarfed and contorted trees, 3 to 5 feet in height, of a species known as the elephant wood (*Veatchia* of the botanists) (see plate 47). They have many large swollen bases and the most grotesque and dropsical forms. In some places the hillsides are covered with them. While at the Tinaja Santa Clara, camp was made near one of these trees. This is another of these extraordinary trees about 4 feet high (see plate 48). From the Tinaja Santa Clara another waterless ride of 50 miles over the desolate plain partly covered with beds of rock salt brought us back to Santa Clara (see plate 49).

From San Ignacio we proceeded eastward to the Gulf, making one of our camps in a rocky canyon (see plate 50) and putting up the tent overnight on account of a rainstorm that overtook us—a rare event in this arid region and the first we had experienced during the months since we set out.

After visiting the Gulf Coast and shipping our accumulated specimens we struck inland again, following up a canyon from the village of Mulejé⁴¹. The bottom of the canyon supports a rank growth of giant cactuses and mesquite trees (see plate 51) due to the heavy floods which sweep down it during infrequent rains. At the head of this canyon is a characteristic deserted ranch (see plate 52) such as we passed all along the route.

Comondu Canyon is another oasis, similar to the one at San Ignacio (see plate 53). It is a beautiful little valley walled in by lava cliffs and dotted with groves of date palms, fields of

sugar cane, and vineyards. The scene from the top of the bordering cliffs was extremely beautiful and weird and suggested the background of some of the Arabian Nights and other Oriental tales. Sinbad the Sailor might have wandered here and the shadow of the Roc's wings might have passed like a cloud over this valley.

Down the Pacific coast beyond Comondu we visited the settlement of Magdalena Bay (see plate 54). This fine large landlocked bay has been for years the favorite winter practice ground for the Pacific Coast fleet. This place is of special interest now, for within the past week the papers have announced that Mexico has granted us the right to have a coaling station there.

While we were there the German training ship "Falke" came in for a few days practice. Their search lights were used and target practice continued until late at night. The officers were very courteous and I was impressed by the eagerness of the Commander for information of all kinds regarding the character and resources of the Peninsula and the keen intelligence shown by the questions he asked.

On the mainland opposite Magdalena Bay is a broad nearly level coastal plain called the Llano de Yrais. A heavy rainstorm that began just as we started to cross it flooded the country, and for two days we had the strange experience of riding through desert vegetation immersed in water as though growing in a marsh (see plate 55).⁴²

On this plain we were so fortunate as to capture a new kind of desert fox—a beautiful little yellowish gray animal with long ears⁴³ (see plate 56). It lives in burrows and when surprised

⁴² This is Nelson's first encounter with the tropical storms or *chubascos* that hit southern Baja California. These storms occur mostly in fall, when the continent starts to cool down but the oceans, which have a higher thermal inertia, are still hot. Low-pressure centers form over the warm tropical Pacific Ocean, where they evolve into tropical storms and hurricanes that often reach the southern tip of the peninsula. *Chubascos* are the main source of precipitation in the southern tip of the peninsula, where they can bring startling ephemeral floods into the otherwise scorching dry desert lowlands.

⁴³ *Vulpes velox debia*.

⁴¹ Current spelling is "Mulegé."

away from home by day is very cunning at concealing itself. It skulks to the nearest bush of other object which breaks the surface nearby and as the danger approaches sinks down flat beside it and is almost certain to escape notice unless seen before it took shelter (see plate 57). When concealment becomes useless, it is up and off like a flash and so swift and graceful that it seems to float across the country like a yellowish gray streak. There was a cattle ranch here and the native cowboys run down coyotes and catch them with their lassos, but when I suggested their doing the same thing with these foxes they laughed at the idea and said they might as well try to catch the wind.

By the time we had reached this point in our journey we supposed all the possibilities of novel forms among the desert plants had been exhausted; but we were mistaken for here was an entirely new type consisting of great beds of devil's cactuses apparently creeping over the ground in all directions like gigantic spiny caterpillars (see plate 58). These cactuses die at the rear end and continue to grow at the front, sending down little rootlets from their under side as they go, so they do actually travel slowly across country as they appear to be doing. They were found only in a limited area during a single day's travel.

From the Llano de Yrais we crossed to La Paz Bay (see plate 59), on the shore of which is located La Paz, the largest and prettiest town on the Peninsula. Here Cortez landed and made the first attempt to colonize this coast. This is a view of La Paz taken from a boat and shows the wharf and part of the town fronting the Bay (see plate 60). Some of the street scenes in La Paz were made very attractive by the palms and other trees in

the many gardens (see plate 61). Our rooms were on the second floor of the hotel with a view across the flat roof of the same building and other roofs of the town. A public stairway led down from the roof into the dining room (see plate 62).

Since early in its history La Paz has been the headquarters for the pearl fisheries of the west coast of Mexico. The main part of this business is now in the hands of an English company with headquarters in London. One local company is now trying to plant the pearl oyster and grow them on a commercial scale with a good prospect of success⁴⁴. The shell of the pearl oyster is the mother-of-pearl commerce. Most of it is shipped to England for making buttons and other articles.

The plains outside of La Paz abound with giant cactuses that appeared to be different from those farther north (see plate 63).

On Ceralbo⁴⁵ Island in the Gulf a few miles from La Paz we found an odd relative of the cucumber which appears to have become tired of waiting for regular rains in such an uncertain climate, so has invented a great water storing base which is filled when opportunity offers (see plate 64). Then the plant is independent of rain for years to come. When the proper time arrives to put forth vines, flowers and fruit it does so independently of weather conditions. In the fall the vines die back to the base and the plant goes to sleep till the following spring. The process if repeated. One of these plants kept on a shelf in a room in the New York Botanic Gardens without soil or moisture except that of the air in an office has sent out vines and fruited for five successive seasons, and Doctor McDougal tells me it appears equal to keeping this up for even a longer period to come. Another striking plant at the Ceralbo Island is the huge Viznaga cactus

⁴⁴ When Nelson and Goldman visited La Paz, the mother-of-pearl industry was the town's economic mainstay. A company founded by Gastón Vives, a medical doctor of French origin, operated at that time in La Paz the world's first commercial pearl oyster culture farm, employing over 1,000 workers and cultivating around 10 million oysters (mainly the mother-of-pearl oyster *Pinctada mazatlanica*, and secondarily the nacre-shell oyster *Pteria sterna*). Mr. Vives developed a system to collect oyster larvae and to rear them under cultivation until they reached harvestable size. The company's main product was mother-of-pearl shell, but was also able to obtain non-cultivated pearls often found inside the oysters (around 10% of oysters grew natural pearls). Although the pearl industry collapsed shortly after the onset of the Mexican Revolution, the lore and legends of pearl diving remained in the community for decades, and provided the basis for John Steinbeck's novel *The Pearl*, written shortly after his visit to La Paz in 1940.

⁴⁵ The correct spelling is "Cerralvo."

which reaches a height of 6 or 8 feet, and a diameter of over two feet (see plate 65).

In a country so filled with thorny plants as are most parts of Lower California life is hard for the cowboys and their horses. The cowboys wear leather-covered hats and heavy leather aprons to protect their legs, but the horses are left to take their chances and are very skillful in avoiding thorns even when going at full speed (see plate 66).

The valley of Todos Santos on the Pacific Coast opposite La Paz is covered with sugar cane and tall scattered palms. The beauty of the view down the valley to the open sea is only poorly suggested by a photograph (see plate 67).

In the canyons of the Cape mountains the vegetation is abundant and very different in character from that of the surrounding desert (see plate 68). While on these mountains, we had some attractive camps among the oaks. After so many months among the desert vegetation it was a great pleasure to again find ourselves among more familiar trees with broad and abundant foliage (see plate 69). Viosca's Pigeon⁴⁶—a bird about the size of a domestic pigeon, and peculiar to this small group of the mountains—was nesting abundantly in the oaks in the higher parts (see plate 70). The nest was a fairly well made platform laid on top of a branch and never contained more than a single egg.

Another of our camps was among the oaks of the Cape mountains at an altitude of about 5,000 feet (see plate 71). Note the difference in the vegetation about our camp in the oaks with that at the following about 3,000 feet lower in the foothills (see plate 72). They give a good idea of the changes in plant life one encounters at different altitudes in these mountains. Some of

⁴⁶ *Patagioenas fasciata vioscae*.

the younger palms retain the dead leaves which cling close to the trunk and give the impression of a robust tree, but the slender bare trunk of a much older palm of the same species, growing alongside, shows the real size of the stem (see plate 73).

Throughout the Cape Region there are many cactuses of the form shown here (see plate 74). They are nearly equal in size to the giant cactus but are a very different species. The paloverde or green tree is one of the most characteristic desert trees over a large part of the Peninsula (see plate 75). It has pale green bark, bright yellow flowers and finely divided leaves. Near the Cape it is unusually large and abundant.

After many months of trying work we reached the end of the Peninsula at Cape St. Lucas and rejoiced that our task was so nearly completed. The Cape is a rocky knob standing out boldly into the sea and sheltering a small bay on which is the nearly deserted little town of Cape St. Lucas, or the Cape as it is called for brevity (see plate 76). In an old ranch at the Cape (see plate 77); Cape Wrens⁴⁷, Cardinals⁴⁸, St. Lucas Woodpeckers⁴⁹, Cape Thrashers⁵⁰ and other birds Xantus first made known were living all about in the jungle which reaches down to the shore⁵¹. For \$1.00 a week we rented a good sized vacant house in the middle of the village (see plate 78) and began work at once by securing some Cape House Finches⁵² from the date palm in front of the door. All through this section the ranches where cows are kept have their cumbersome cheese presses with long arm-like levers weighted with stone (see plate 79). This is one of the few flowering cactuses we saw at the Cape (see plate 80).

From the Cape we traveled eastward a short day's journey to the town of San Jose del Cabo, situated in the most fertile agri-

⁴⁷ Possibly *Campylorhynchus brunneicapillus affinis*.

⁴⁸ Includes the Northern Cardinal, as well as the Phyruloxia, *Cardinalis sinuatus*.

⁴⁹ *Picoides scalaris lucasanus*.

⁵⁰ *Toxostoma cinereum cinereum*.

⁵¹ Although the mention to John Xantus in Nelson's manuscript is but fleeting, the visit to Xantus' ranch must have been a sort of pilgrimage for the two travellers. János Xántus (John Xantus, a naturalized American citizen born in Hungary in 1825) lived in Cabo San Lucas for two years (1859–1861) working as a tidal observer for the United States Coast Survey. Xantus—who had been recommended for this position by Spencer Baird, head of the Smithsonian Institution—was a picturesque character with a volatile temperament, but a formidable naturalist. He collected lizards and insects, captured crabs and starfish, gathered mollusks, netted fish, and pressed plants for the Smithsonian's Natural History Museum. The famous botanist Asa Gray described 121 new plant species from Xántus' specimens, and almost half of the mollusks, crustacea, insects, and birds he collected were new to science. Many species of animals bear his name, including the Xantus' Hummingbird, Xantus' Murrelet, and a whole family of Night-lizards—the Xantusiidae—together with several plants such as Xantus' Clarkia, Xantus' Pincushion, Xantus' Spineflower, and Xantus' Mimosa, among many others.

⁵² *Carpodacus mexicanus ruberrimus*.

cultural valley in the Cape Region, and the center of the small tropical area of the Peninsula (see plate 81). This place was nearly destroyed a short time ago by a cyclone and flood. A favorite method of transporting water from waterholes to ranches in the sandy country is by means of a barrel with an iron pin in each end (see plate 82). The pins serve as the axle so that the barrel may be trundled home like a big wheel.

We are now at the end of the overland journey. Our steamer lies off the beach at San Jose and after an absence of nearly a year and the successful completion of our task we are homeward bound (see plate 83).

Plate 1. Flood plain to the east, at the base of the Cocopah Mountains. [Note the large amounts of water that flooded what at that time were the lush wetlands of the Colorado River Delta.]



Plate 2. Main peak, Cocopah Mountains.



Plate 3. Mud volcano in the silt plains of the Colorado River Delta. [At the turn of the 20th century these mud geysers were visited by the inhabitants of Calexico for medicinal mud-baths. In 1972 the Mexican government established a geothermal power plant at this site, still in operation.]





Plate 4. Young Bald eagle on nest at Todos Santos Island. [The Bald Eagle has not been observed nesting on the islands for several decades.]



Plate 5. Desert vegetation on the eastern base of the San Pedro Martir Mountains. [The giant cactus is *Pachycereus pringlei* (Cardon). Also pictured in this plate is *Fouquieria splendens* (Ocotillo) and *Cercidium microphyllum* (Little-Leaf Paloverde).]

Plate 6. East front of San Pedro Martir Mountains. [The shrub is *Larrea tridentata* (Creosote Bush, or *Gobernadora*); growing with saltbush or *chamizo* (*Atriplex* sp.).]



Plate 7. Vallecitos (Murray Pines), San Pedro Martir Mountains. [Young Murray Pines (*Pinus murrayana*), the dominant tree species in the high sierra, are seen colonizing the valley.]





Plate 8. Sugar and Murray Pines, San Pedro Martir Mountains. [Dense mixed stand of *Pinus lambertiana* (Sugar Pine) and *Pinus murrayana*.]



Plate 9. East Escarpment, San Pedro Martir Mountains.



Plate 10. Valley woods at La Grulla. [Stands of *Pinus jeffreyi* (Yellow Pine) are shown in this plate surrounding the meadow.]



Plate 11. *Cotyledon* on San Martin Island. [Previously grouped within the genus *Cotyledon*, the live-forevers are now in the genus *Dudleya*. The image shows *Dudleya anthonyi* (San Quintin Liveforever), an endemic that has a very restricted distribution in this region.]

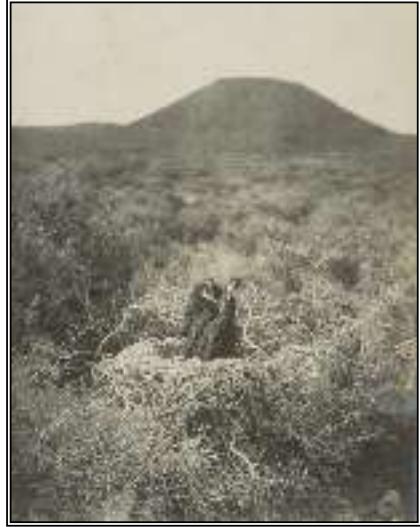


Plate 12. Cormorants on nest San Martin Island
(*Phalacrocorax albociliatus*) [Now classified as
Phalacrocorax auritus albociliatus.]



Plate 13. Osprey nest on rock San Martin Island.

Plate 14. Osprey nest on *Cereus pringlei*, Santa Margarita Island. [The image, taken by Nelson near the end of his trip while in Baja California Sur, shows the ospreys nesting on a Cardon (*Pachycereus pringlei*); also pictured in the plate is *Fouquieria diguetii* (Palo Adán or Adam's Tree), visible in the background.]



Plate 15. *Larus occidentalis* on beach, San Martin Island.





Plate 16. Agaves and *Fouquieria columnaris* near San Fernando. [Known as *Cirio* in Spanish since the 1700s, *Fouquieria columnaris* was given the common name "Boojum Tree" in the 1920s by Geoffrey Sykes, an English botanist working in Tucson. Also pictured in the foreground is *Agave cerulata* ssp. *nelsonii*.]



Plate 17. Agaves, *Fouquieria columnaris* and *Cereus pringlei* near San Fernando. [A young Cirio is seen growing with *Cylindropuntia cholla* (front, left side) and *Hesperoyucca peninsularis* (middle, incorrectly identified by Nelson as an agave).]



Plate 18. Forest of *Fouquieria columnaris* near San Fernando. [Dense stand of Cirios with *Agave cerulata* scattered around in the foreground.]



Plate 19. Young *Fouquieria columnaris* near San Fernando.



Plate 20. Trail through *Fouquieria* forest (2 species) near San Fernando. [A large branched Ocotillo is seen on the left side of the plate, with tall, erect Cirios on the right and in the background.]



Plate 21. Palms near Cataviña. [There are actually two different palms shown in the plate: the tall thin *Brahea armata* (Mexican Blue Fan Palm) and the shorter and more stout-trunked *Washingtonia filifera* (California Fan Palm).]



Plate 22. *Cereus* and *Fouquieria* near Cataviña. [The plate shows Cardon and Cirio, plus a hillside of *Stenocereus gummosus* (Galloping Cactus, Sour Pitaya, or *Pitaya Agria*).]



Plate 23. Forest of *Cereus*, palms and *Fouquieria columnaris*, Cataviña. [The plate shows a spectacular mixed stand of Cardon, Cirio, palms, and the cholla cactus *Cylindropuntia alcahes* scattered around the landscape.]



Plate 24. *Cereus* (?) San Francisquito. [The plant is *Lophocereus schottii* var. *schottii* (Old Man Cactus or *Senita*).]



Plate 25. Calamahue wash near mission. [*Cylindropuntia bigelovii* (Teddy-Bear Cholla) in the foreground and *Cylindropuntia alcahes* in the background, with Ocotillos on the side.]



Plate 26. Calamahue wash near mission. [An unidentified cholla (possibly *Cylindropuntia munzii* or *C. alcahes*) is visible on the left and *Senita* cactus on the right, with Cardons and Ocotillos in the background.]



Plate 27. Near Yubay, *Agave*, *Yucca*, *Fouquieria*, *Cereus*. [*Cylindropuntia ganderi* (Gander's Cholla) and *Agave shawii* ssp. *goldmaniana* (Goldman's Agave) in the foreground; Cardon, Cirio, and *Yucca valida* (*Datillillo*) in the background.]



Plate 28. Camp at Yubay. [In Baja California's Central Desert, the campground is seen surrounded by magnificent stands of Cirio, Cardon, and Sour Pitaya.]



Plate 29. Vegetation at Yubay *Fouquieria* (2 species), *Cereus pringlei*. [The low perennial "yellow flowered composite," as described by Nelson, is possibly *Viguiera laciniata*, growing in this plate with Cardon, Cirio, and Ocotillo.]



Plate 30. *Dasyllirion* at Yubay. [The species is actually *Nolina bigelovii* (known as *Sotal* in Baja), a desert rosette plant in the same family as, and quite similar to, *Dasyllirion*.]



Plate 31. Spring cactus near San Andrés. [The harpoon-like spines of the Long-Spine Cholla (*Cylindropuntia molesta* var. *molesta*) become inserted into the flesh of animals and serve as an effective, albeit painful, means of vegetative dispersal.]



Plate 32. *Agave* forest near Santo Domingo. [The species is *Agave shawii* ssp. *goldmaniana* (Goldman's Agave), growing with *Yucca valida* (*Datillillo*) in the background.]



Plate 33. *Yucca* forest near Santo Domingo. [*Yucca valida* (Datilillo, or Baja California Tree Yucca).]



Plate 34. *Yucca* forest near Santo Domingo. [The plate shows leaning *Yucca valida* and a few cholla (*Cylindropuntia cholla*) plants.]



Plate 35. Road from Santo Domingo to Calmalli.



Plate 36. Giant cactus near Calmalli. [Large Cardon, with Datilillo (*Yucca valida*) on the left and Adam's Tree on the right.]



Plate 37. Desert at Calmalli with viznaga in foreground. [*Ferocactus peninsulae* (Peninsular Barrel Cactus) surrounded by *Agave cerulata*, with Cardon and Cirio in the background.]



Plate 38. San Pablo Canyon at mouth.



Plate 39. Canyon near Tinaja Santa Ana.



Plate 40. Tinaja San Juan near San Ignacio.



Plate 41. Interior of house at San Ignacio.



Plate 42. Town of San Ignacio.



Plate 43. Old Mission Church San Ignacio.



Plate 44. Date ranch, San Ignacio.



Plate 45. Water hole at San Angel, west of San Ignacio. [The image shows the introduced European Date Palms (*Phoenix dactylifera*) growing wild in the oasis, together with Spiny Rushes (*Juncus acutus*).]



Plate 46. Tinaja Santa Clara.



Plate 47. Camp at Tinaja Santa Clara by *Veatchia* tree. [Throughout the text Nelson uses the old taxonomic name *Veatchia* for the Elephant Tree, now classified as *Pachycormus discolor*.]



Plate 48. *Veatchia*, Santa Clara Mountains. [*Pachycormus discolor*.]



Plate 49. Santa Clara desert.



Plate 50. Camp on road to Santa Rosalia. [South of San Ignacio vegetation changes quite abruptly, the Boojum Trees disappear and new, more tropical species show up, like the large Palo Blanco (*Lysiloma candida*) on the right side of the tent.]



Plate 51. Canyon above Mulege. [The image shows a thicket of Cardon, cholla, and Palo Verde. Heavy trampling by cattle suggests the plate was taken near a ranch with a water hole. Although mentioned in Nelson's notes, no mesquite tree (*Prosopis articulata*) is visible in the image.]



Plate 52. El Potrero deserted ranch above Mulege.



Plate 53. Comondu Canyon.



Plate 54. Magdalena Bay. [Soledad Landing belonged to the Chartered Company of Lower California, an American trading company that had extracted with commercial success a fog-fed desert lichen called "orchilla," used for textile dyeing. Chemically-produced dyes out-competed the orchilla industry in the 1890s, and at the time of Nelson and Goldman's visit the town survived by exporting sea-turtle meat to the U.S. and by selling dry beef to visiting naval warships.]

Plate 55. Flooded desert of Yrais. [This is Nelson's first encounter with the tropical storms or *chubascos* that hit southern Baja California. In the puddles left behind by the storm, typical desert species can be seen: cholla (*Cylindropuntia cholla*) in the front left, and *Stenocereus thurberi* (Organ Pipe Cactus, or *Pitaya Dulce*) in the front right; plus various large cardons in the background.]



Plate 56. Desert fox — desert of Yrais.





Plate 57. Desert fox — desert of Yrais.



Plate 58. Devil's cactus, Magdalena plains. [The crawling cactus is the *chirinola* or "creeping devil," *Stenocereus eruca*, endemic to cool coastal flats of the Magdalena Plains.]



Plate 59. La Paz Bay.





Plate 60. La Paz.



Plate 61. Street in La Paz.



Plate 62. Roof of Hotel La Paz.



Plate 63. Giant cactus — Tres Pachitas. [Large Cardon with cholla (*Cylindropuntia cholla*) plants surrounding it.]



Plate 64. Storage plant — Ceralbo Island. [The plant is the *guaregui* or "coyote melon," *Ibervillea sonora*, a desert vine that accumulates water and nutrients in its gigantic tuberous root.]

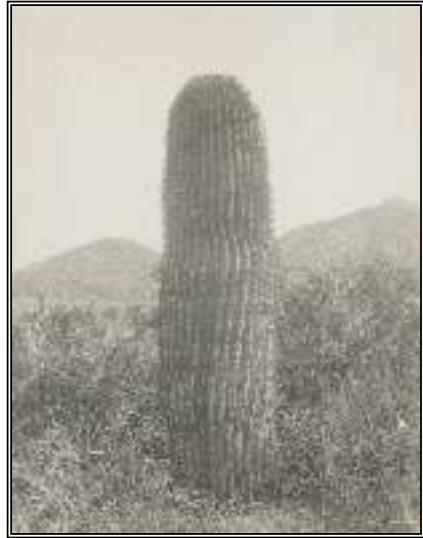


Plate 65. Bisnaga (*Echinocactus*) Ceralbo Island.
[The Giant Biznaga Cactus (*Ferocactus diguetii* var. *diguetii*, identified by Nelson as *Echinocactus*) is an insular endemic only known to islands in the southern part of the Gulf.]



Plate 66. Cowboy near Laguna Mountains.



Plate 67. Sugar cane field Todos Santos. [The palms near the sugarcane fields appear to be *Brahea brandegeei* (Brandegees Fan Palm, or *Palmia*, in Spanish), endemic to Southern Baja California.]



Plate 68. Vegetation in Canyon at base of Sierra Laguna. [The Southern Baja fan palm *Brahea brandegeei* is seen in the image growing with the white-trunked *Populus monticola*. Both species are common in the foothill canyons of the Sierra de La Laguna.]



Plate 69. Camp among oaks on Sierra Laguna.



Plate 70. Nest of *Columba vioscae* at Sierra Laguna.



Plate 71. Camp in oaks on way down Sierra Laguna.



Plate 72. Camp at south base Sierra Laguna in cactus forest.



Plate 73. Palm at south base Sierra Laguna. [*Brahea brandegeei*.]



Plate 74. *Cereus* (?) near Cape San Lucas. [Organ Pipe Cactus, or *Pitaya dulce* (*Stenocereus thurberi*).]



Plate 75. Palo verde near Cape San Lucas. [*Cercidium floridum* ssp. *peninsulare*, common in the Cape.]



Plate 76. Cape San Lucas.



Plate 77. Xantus's house at the Cape. [Xantus had collected myriad different species for the Smithsonian Institution almost half a century before Nelson and Goldman's expedition, and he was a legend among scientists in Washington. The visit to Xantus ranch must have been like a scientific pilgrimage for the two travellers, a source of inspiration and intellectual stimulus.]



Plate 78. Our house at the Cape.



Plate 79. Cheese press at the Cape.



Plate 80. Flowering *Cereus* at the Cape. [Flowering *Pachycereus pecten-aboriginum* (Indian Comb Cactus, or *Cardón Barbón*); the composite *Ambrosia ambrosioides* (Ragweed, or *Chicura*) is seen surrounding the cactus.]



Plate 81. San José del Cabo.



Plate 82. Water boy with barrel San José del Cabo.



Plate 83. Steamer offshore at San José del Cabo. [The crates or "*huacales*" on the beach contained brown sugar loaves or "*piloncillo*" from Todos Santos, and were regularly exported to Mazatlán.]

Cover photograph:
Sunset in Bahía Magdalena. [The cargo sloop *Catarina*, owned by the Chartered Company of Lower California, was used to move cargo from the Baja California mainland into Soledad Landing on Magdalena Island. November 1905.]

