

THE BREEDING BIRDS OF CENTRAL LOWER CALIFORNIA

WITH ELEVEN ILLUSTRATIONS

By GRIFFING BANCROFT

A Contribution from the San Diego Society of Natural History

By wagon road and burro trail it is an even one hundred miles from Santa Rosalía, on the Gulf of California, to the tide line of the Pacific at San Ignacio Lagoon. The intervening country is essentially a desert. The summit, which is two thousand feet high in the passes and nearly three times that altitude in the mountains, lies within ten or twelve miles of the Gulf. The two watersheds are thus of unequal length. They are also of quite distinct configuration. On the eastern side the descent to sea-level is abrupt and precipitous, checked by two rather extensive valleys. The long western slope, on the other hand, is broken by valleys, cañons, and pretentious hills. It is marked with the weird formations which are characteristic of arid North America and which are here exaggerated. Angles and profiles of silhouetted hills and table-tops are unusually harsh and forbidding. There is not even the softening effect of grandeur.

Over the major portion of the entire region lava has flowed and mesa, valley and mountains are covered with dull brown rocks. This lava sheet, though of varying thickness, normally does not exceed three feet in depth. In overlaying the ancient sandstone it parallels the slopes of the hills and the sides of the cañons, while on the mesas, and sometimes in the valleys too, it is as level as they and often stretches away as far as the eye can see. The lava covering, in the process of cooling, has broken into fragments that rarely exceed a cubic yard in size. The edges are sharp and the lines of cleavage easily traceable. Indeed, so slightly has the deposit weathered, it seems as though but yesterday it solidified and cracked.

The lava surface is not present everywhere, but it does cover four-fifths of the area we examined. Where it is absent it presumably either has been removed by water or covered with ashes or sand. An exception is the western margin of the cross section where the ocean and lagoon bottoms have changed position in recent geological times. These are either smooth and salt-crusts or else they have been worked into sand dunes.

There are several systems of dry river beds which have an important influence on the biology of this region. Even though the country be arid beyond anything known in the United States there still is enough rainfall to provide some moisture. This water, as well as a part of that from the cloud-bursts that come once in a decade, finds its way to the sea by means of a subterranean flow. The conspicuously marked stream courses and the accompanying level valley floods are outstanding features of the landscape. The alluvial deposits are usually river sand, but they also include extensive beds of cobble stones or of relatively fertile silt.

Occasionally the subterranean flow encounters bed rock formations which force the water to the surface. On the Gulf side, three miles west of Santa Agueda, there is an oasis which supplies water for Santa Rosalía and its suburbs as well as for numerous truck gardens. On the Pacific watershed, where the drainage lines are longer, we found natural surface water at San Joaquin, the Alamo, and in José María Cañon. Outstandingly the most extensive of the oases is San Ignacio, where a town of a thousand people is supported. The settlement contains truck gardens and orchards in addition to a jungle of date and fan palms.

Climatically the two watersheds of the peninsula differ decidedly. The western slope is tempered by its exposure to the trade winds blowing from the ocean, while on the other side the shelter of the hills often produces a veritable inferno. Notwithstanding this the flora is quite homogeneous as is also the fauna, with a few rather remarkable exceptions.

The most conspicuous of the native growths is the giant cactus (*Pachycereus calvus*) known also as sahuaro or cardón. Wherever environments are not too hostile there are to be found these immense plants, which often attain a height of forty or fifty feet. In favored locations, though spaced irregularly, their arrangement is not unlike that of trees in an orchard. They dot the landscape of the lava fields wherever they can find a toe hold, and they take remarkable advantage of seemingly hopeless spots in which to live.

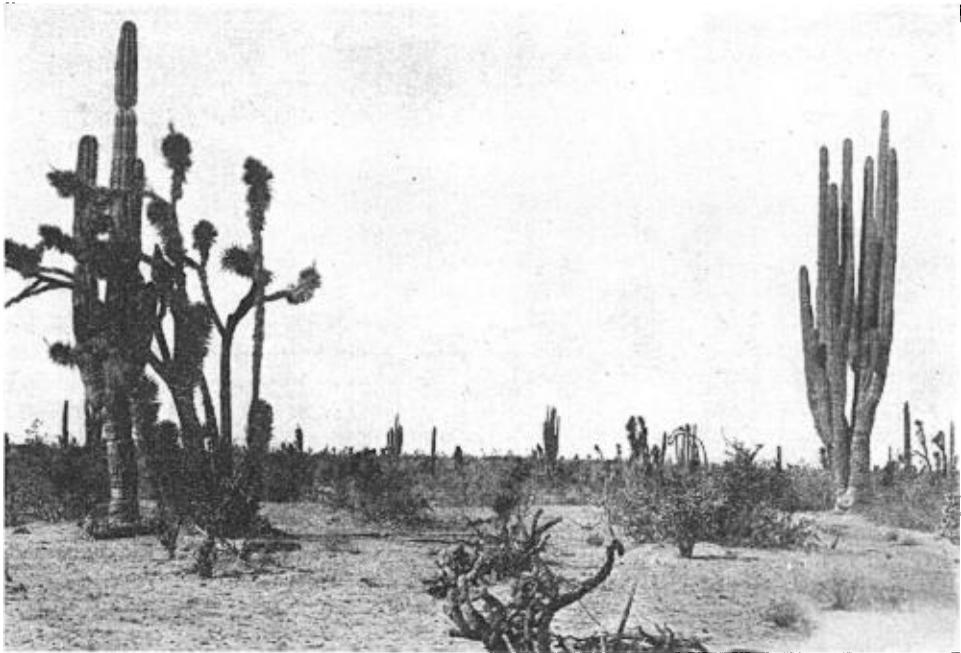


Fig. 10. THE DESERT EASTWARD FROM SAN IGNACIO; SHOWS A VALLEY IN WHICH CACTUSES OF SEVERAL KINDS PREDOMINATE IN THE VEGETATION.

The most abundant of the cactuses are the *Opuntia*, more commonly known as cholla. There are many species represented, and their distribution seems quite uninfluenced by geography. Like the cardón they have a sporadic growth in the lava fields and one that is quite heavy where there is a bit more soil. There is a hard struggle for existence, as is shown by absence of the thick clusters to which we are accustomed on our side of the line.

The tree yucca (*Yucca valida*), often called the Joshua tree, is abundant locally on the higher elevations of the Pacific side. It shows a marked preference for the more fertile plains, leaving to the copalquin or elephant tree (*Pachycormus discolor*) the more stony portions of the highlands. The latter was barely beginning to bloom June 15, 1928, and there is a speculative possibility that when it comes into full

flower it may attract new birds to this region. There is an irregular growth of sage and other brush, occasionally heavy, but for the greater part sparsely scattered over the valleys and even the lava fields. Of lesser growths there is a multitude. They are of little interest to ornithology, however, except as sources of food supply for birds.

The most important riparian plant is the mesquite (*Prosopis glandulosa*). Decidedly more than three-fourths of the trees lining the stream beds are of this species. It spreads over the valley floors and maintains itself in shrub form in many less propitious spots. Palo verde (*Cercidium torreyanum*) rivals the mesquite in stature, though incomparably less abundant. It is not able to endure such hardships as is the other. The palo blanco (*Lysiloma candida*) is largely confined to the cañons emptying into the gulf. The thick and thorny arrow tree (*Sebastiania bilocularis*) is rather rare and limited to alluvial associations, but it is of great importance ornithologically because of being so eagerly sought for nesting sites.

During March, April and May and the first half of June of 1928, an ornithological survey was made, from salt water to salt water, of a strip across the peninsula. Starting with Santa Rosalía and its suburbs we followed the stage road to San Ignacio and then packed with a burro train through San Joaquin, the Alamo, and José María Cañon to the southern edge of San Ignacio Lagoon.

The party included, besides the writer, Mrs. Bancroft, Mr. J. Elton Green of Berkeley, and, until the end of April, Mr. Nelson K. Carpenter of San Diego. We are glad to acknowledge generous assistance from Dr. Clinton G. Abbott of the San Diego Society of Natural History and of Mr. A. J. van Rossem, who identified all the skins we brought home. We are indebted to every American and Mexican official with whom we came in contact for the uniform sympathy and courtesy which made our work possible. Especially do we owe recognition to M. Auguste Nopper and other officials of the Compañie du Boleo for hospitality in Santa Rosalía, and to General Abelardo Rodriguez, the progressive, road-building Governor of Lower California, for official aid in the pursuit of our studies.

In compiling these notes I have endeavored to include all the birds giving reasonable evidence of breeding within the limits of the selected zone. The Raptores present problems of such general nature that they had better be discussed in a separate paper. They are listed merely to keep the record complete. A few aquatic transients remained as late as June 13. Experience elsewhere indicates that they are non-breeders; still it seems safer to mention them, especially the dowitcher. At that date a small flock of Lesser Scaup Ducks (*Marila affinis*) and some Ruddies (*Erismatura jamaicensis*) were on the fresh-water ponds of San Ignacio, and a pair each of Hudsonian Curlew (*Phaeopus hudsonicus*) and long-billed Dowitcher (*Limnodromus griseus scolopaceus*) were shot in San Lucas Lagoon. The sex organs of the female of the latter were the only ones to show signs of development.

By mentioning every bird which seems to be a probable breeder, omissions become almost as interesting as records. It does not seem likely, considering the length of time devoted to this search and the thoroughness with which the work was done, that any bird not on our list breeds here. The absence of many genera resident close to this cross section, either to the north or eighty miles away across the gulf, was one of the surprises of the expedition.

To avoid confusion I have followed exactly the scientific nomenclature adopted by Dr. J. Grinnell in his "Distributional Summation of the Ornithology of Lower California" (Univ. Calif. Publ. Zool., vol. 32, 1928, 300 pp., 24 figs.). All the measurements are from eggs in my collection.

Colymbus dominicus brachypterus. Short-winged Santo Domingo Grebe. This little grebe breeds sparingly in the fresh-water tule-bordered lagoons of Santa Agueda and San Ignacio. In marked contrast to the habits of the eastern representatives of this race as described by Bent (Bull. 107, U. S. Nat. Mus., 1919, p. 36) we found a preference for the hearts of tule patches as nesting sites. Of the few nests that were in the open none were in clear water; they were carefully blended into a thick mass that gave them protective coloration. The nest itself is a floating mass of decaying vegetable matter. The submerged portion, some six inches thick by a foot and a half to two feet in length, barely suffices to keep the cup out of water. The rim of the egg cavity is banked with loose materials. These the sitting bird pulls over her eggs whenever she leaves. Whether she moves off leisurely or is flushed, a few quick pecks hide every vestige of shell.

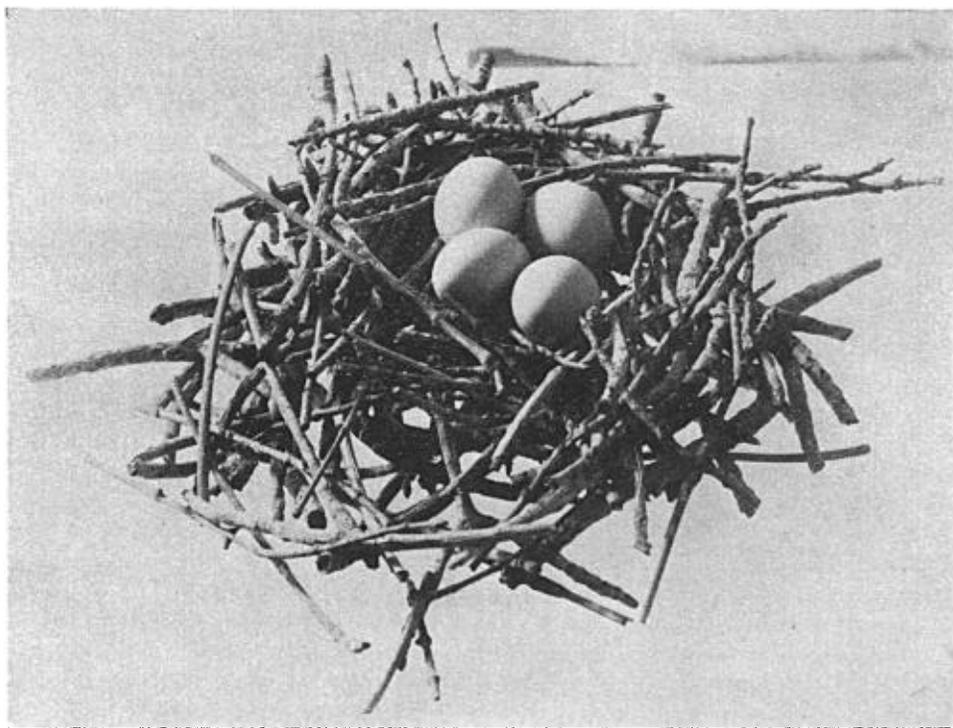


Fig. 11. NEST AND EGGS OF FRAZAR GREEN HERON COLLECTED IN THE LAGOON AT SAN LUCAS, JUNE 12, 1928.

The breeding season is long; fresh eggs are to be found at least from March until late in May. We took but one set, four eggs which averaged 31.9 x 23.0 mm. The downy young of the Mexican Grebe is the most precocious of the genus. It can dive and swim under water from the hour it is hatched. From the outset it hides by floating so nearly submerged that only the bill shows above the surface.

Podilymbus podiceps podiceps. Northern Pied-billed Grebe. The reservoir at San Ignacio is a body of water half a mile long and several hundred feet across. The greater portion of its shore is lined with a heavy growth of tules. Well within the densest stands some half dozen pairs of these grebes make their homes. Their breeding season begins early in April and extends through June. The birds

lay, quite consistently, four, five, or six eggs. This small average size of clutches is the most noticeable distinction between the habits of the birds of San Ignacio and those of central California.

15 eggs from San Ignacio average 43.8 x 31.7 mm.
69 eggs from California average 44.5 x 30.0.

These figures, from the meagerness of the data, do not necessarily indicate differences in size or shape. The eggs in both series, however, are consistently and materially larger than are those from the eastern United States.

Ixyobrychus exilis hesperis. Western Least Bittern. These bitterns were found in the reservoir at San Ignacio. It is quite difficult to estimate their number, for they were shy and could be seen only with difficulty. Mr. Green, who worked in the tules more than I did, estimated their number at twenty-five pairs.

The one nest we found contained, May 17, five eggs in such an advanced stage of incubation that they could not be saved. The nest itself was little more than a bundle of tules placed almost on the water and supported by dead matter floating there.

Butorides virescens frazari. Frazar Green Heron. We examined six nests, old and new, in San Lucas Lagoon. There was striking uniformity both in construction and in the sites selected. The crude platforms were small, even for a Green Heron. The nests were made entirely from dead mangrove twigs which seldom exceeded eight inches in length or a quarter of an inch in diameter. They were placed on crossed horizontal branches just below the canopy of leaves. Thus they were about four feet above the water at high tide. They were set five feet into the tangle, barely far enough to render them invisible from the water side.

The breeding season is at its height in early June. On the 7th and 12th of that month we found eight eggs, two clutches of two and one of four. The following comparative measurements are consistent.

Average of 7 eggs of the Frazar Green Heron, 36.0 x 27.6 mm.
Average of 39 eggs of the Eastern Green Heron, 37.7 x 28.4.
Average of 36 eggs of the Anthony Green Heron, 38.5 x 29.7.

B. v. frazari is apparently also resident in the fresh water of San Ignacio. We took an adult there in May, and Mr. Green found birds on the reservoir in the spring of 1927.

Porzana carolina. Sora Rail. We did not have the good fortune to find proof of the breeding of this small rail, though we saw or heard it continuously in the fresh water ponds of San Ignacio.

Fulica americana americana. North American Coot. A flock of approximately a dozen pairs nests in the reservoir at San Ignacio, and there are stragglers in the adjacent ponds. The birds begin to lay in May, but it is not until June that breeding reaches its height. The clutches are small. Those we found ranged from five to eight eggs.

The coots of San Ignacio build typical nests of dead tule stalks, but they conceal their homes much more carefully than do the more northerly breeders. They work their way into the denser tule growths and lay where they are entirely hidden from outside observation. One pair, however, instead of making a floating nest placed its structure four feet above the water where it was supported by living stalks that had been bent downwards.

Oxyechus vociferus vociferus. Northern Killdeer. One pair of birds was found near Santa Rosalía and two heavily incubated sets of eggs, a four and a three, were taken at San Ignacio on April 13 and May 4 respectively. There was a brood of chicks, ten days old, at Alamo on May 21. The local breeding habits present nothing novel.

Pagolla wilsonia beldingi. Belding Wilson Plover. There is a narrow peninsula, two or three miles in length, which separates San Lucas Lagoon from the gulf. The greater part of the surface is covered with cobble-stones, though there are occasional areas white with clam shells. Ten or twelve pairs of Belding Plover breed there. I sought their nests as I would have done those of the Snowy Plover, on shell-covered ridges where there would be both protective coloration and lookout points for the birds. I found fifty old nests—the accumulation of years—but not where I expected them to be. They were among the dark boulders and they were conspicuous because of their white shell linings. Some were on ridges and some in hollows, the strong preference of the bird being to place them between three cobble-stones so that, when sitting, it would be advantageously hidden. The nests were about eight inches across and perhaps half as deep. The parents had clearly removed pebbles, excavated cups, and brought in shells for a lining.

On June 14, the only day I hunted them, none of these nests contained eggs. We found a ten day old chick and from it and other evidence concluded that the breeding season here is early May.

Lophortyx californica achrustera. San Lucas California Quail. There is no considerable gap in the cross section where these quail were not observed. They insist on riparian associations, but they follow these without regard either to altitude or to the character of the country adjoining the stream beds. They definitely do not require the presence of water.

They were fairly abundant in José María Cañon and near the other oases they were not rare; and yet, though spreading from the sand dunes to the edge of the gulf, the total number of birds is comparatively small. The flocks seldom exceed a dozen pairs and even those are generously spaced within their habitat.

Our experience with the breeding of these quail was limited to San Ignacio. That was because the nests were too well hidden to be found, except accidentally, and those we saw were shown to us by the natives. Three of the sites were in damp ground in rank grass; one of them, to our surprise, on a tiny islet in a swamp. Two nests were in vineyards, two in natural cavities among the sucker growths of date palms, and one was under a lava rock on the mesa. In all but the last three cases the birds had excavated a cup nearly as deep as it was broad and had lined it with materials brought in, grass, leaves, and feathers. The breeding season commences about the first of June and is hardly well under way until after the middle of that month. The number of eggs in a clutch is rather consistently ten or eleven, sixteen being the most we found in any one nest. The following table is undeterminate as far as the two northerly subspecies are concerned but it does show that *achrustera* consistently lays the largest eggs of the three races.

San Lucas Quail,	80 eggs average 32.3 x 24.7 mm.
San Quintin Quail,	150 eggs average 30.6 x 23.3.
Valley Quail,	144 eggs average 30.2 x 24.1.

Zenaidura macroura marginella. Western Mourning Dove. We found no nests of this dove, and yet there is much evidence to indicate that it breeds in this locality. As late as May 21, in José María Cañon, I observed a pair engaged in courtship. The species was distributed, away from habitations, wherever there was water. As a consequence it was most plentiful west of San Joaquin and in the

upper parts of Santa Agueda Cañon. It is not a common bird anywhere and seems to maintain a precarious foot-hold in these desert regions.

Melopelia asiatica mearnsi. Western White-winged Dove. Very evenly distributed across the peninsula. We found nests in the mangroves of San Lucas, in the sahuaro and tree yucca associations of the desert, among the palms of San Ignacio and near the water holes in José María Cañon. The sight of a White-winged Dove perched atop of a great cardón became too familiar to cause comment.

These doves breed wherever found and do not, in my opinion, wander far from their nests. These are well concealed by being set within the heart of thick vegetation. The larger trees are favored on the deserts, inter-laced leaves in the palm jungles, and brush or heavy weeds in riparian associations. A typical nest is built of rather long grass stems twisted to form a small disc. Laying begins early in April and continues at least to the middle of June. Forty-five eggs from this region average 30.0 x 22.5 mm.

Chamaepelia passerina pallescens. Mexican Ground Dove. The presence of water seems to be the determining factor in the distribution of this little dove. It is common wherever there are irrigation ditches or pools or available water in any form. As a consequence its occurrence is locally concentrated. It is abundant in the cultivated regions about Santa Rosalía and San Ignacio. At intervals west of the latter village and of San Joaquin, ten miles to the south, there are springs, both natural and artificial. Farming is not practiced at all in the more westerly section and so the abundance of the birds there, away from civilization, shows that the requisite for its presence is water rather than special food supply.

José María Cañon is about forty miles southwest of San Ignacio. Underground water has resulted in a substantial growth of the usual riparian vegetation of the region, mesquite along the borders, flanked by palo verde and heavy brush, with rank weeds over much of the bottom. Here the men who handle packtrains have opened holes to obtain water for their animals. Constant evaporation results, in time, in these tanks becoming increasingly impregnated with salt and alkali. The solutions eventually reach such strength that not even thirsty burros can drink them. New holes are therefore scraped out from time to time and the process repeated. It is interesting to note that the water unfit for these animals is generously used by the ground doves. So much so, indeed, that they are more plentiful here than in any other part of the cross section.

The birds breed near open water. They carry their demand for its proximity so far that, assuming my notes to represent a fair average, four-fifths of their nests are within fifty feet of a place to drink. I was surprised when this fact began to develop and I found myself looking about for water whenever I flushed one of the doves from eggs or young. Seldom, indeed, was it not close at hand. There is a marked contrast here with the birds of southern Sonora. There they abound on the open mesas and breed freely twenty to fifty miles or more from water.

The Mexican Ground Dove is an unobtrusive little fellow, blending his coloration into his background on every occasion, and carrying his reticence into his choice of nesting sites. He certainly does like concealment for his home, far more so than the birds of the opposite mainland. Trestled grapes are plentiful in this part of Lower California. Commonly a beam of palm wood three or four inches wide is supported on uprights at a height of five feet and a vine is trained to grow over this structure. The favorite nesting site of the dove is on the flat surface of the beam. The bird is snuggled in among the leaves, ideally protected and hidden.

Another popular haunt is in the palm jungles. At heights of from four to ten feet and on the stems of the vertical leaves of the date palms numbers of these birds build. They seek the shadows that come from heavy vegetation or crossed leaves. Most of the fan palms have been trimmed, their leaves being cut largely for roofing material. The stubs left are generally about a foot long, smooth and well cupped. Here, hidden from below and concealed from the sides, many of these doves raise their young. The preferred height is twelve to fifteen feet above the ground.

This dove is tame, flushes at close range, and plays cripple most artistically. The laying season begins the middle of April. The nests are the most substantial of any of the local Columbidae and often attain a thickness of an inch or more. They are built of comparatively long and fine materials, palm fibre and grass stalks being the favorites. They are well matted and the strands are twisted spirally to form a flat disc to which is added somewhat finer material in the center. Fifty-four eggs collected from Santa Agueda to San Joaquin average 21.9 x 16.3 mm.

Cathartes aura septentrionalis. Northern Turkey Vulture. Abundant throughout the cross section, especially on the eastern coast.

Parabuteo unicinctus harrisi. Harris One-banded Hawk. Common from San Ignacio to Santa Rosalía.

Buteo borealis calurus. Western Red-tailed Hawk. Fairly common from José María Cañon to Santa Rosalía.

Buteo abbreviatus. Zone-tailed Hawk. One seen near Santa Rosalía in April and one at San Ignacio in March.

Falco mexicanus. Prairie Falcon. Rare near Santa Rosalía.

Falco peregrinus anatum. American Duck Hawk. Rare at San Ignacio.

Falco sparverius peninsularis. San Lucas Sparrow Hawk. Quite common, breeding in the cardón, from Santa Rosalía to José María Cañon.

Polyborus cheriway auduboni. Audubon Caracara. Quite common on both coasts and not rare in the interior.

Tyto alba pratincola. American Barn Owl. Found only in the Mission San Ignacio.

Otus asio xantusi. Xantus Screech Owl. Not rare from San Ignacio, breeding, to José María Cañon.

Bubo virginianus elachistus. Dwarf Horned Owl. One seen near Santa Rosalía. One adult shot at San Ignacio, and five, presumably a family, observed in one day in José María Cañon.

Geococcyx californianus. California Road-runner. Rare but of peninsula-wide distribution. My census shows two near Santa Rosalía, three in the vicinity of San Ignacio, and one at the mouth of José María Cañon. They are wild and shy beyond understanding, taking alarm at a distance of a furlong or more and disappearing permanently into the brush.

I found two sets of eggs, hardly enough to establish breeding habits, but still indicative. Both were complete with two eggs. One was taken May 14, in the heart of a date palm. The nest was seven feet above the ground and so well concealed that it could not be seen until much of the foliage had been cut away. The other set was completed June 5. This nest was built at a height of six feet in a thick bush-like mesquite in a dry river bottom. Both were bulky affairs, two feet

across by eight inches deep. They were crude cups of coarse twigs filled almost to the top with fine matted matter.

Dryobates scalaris lucasanus. San Lucas Ladder-backed Woodpecker. This little denizen of brush and thick undergrowth requires a heavy stand of low cactuses in which to feed and rest. It occurs from the shores of the Gulf to the mouth of José María Cañon. Though the rarest of the resident Picidae it is still fairly common. Its nesting instincts are quite distinct from other *Dryobates scalaris*. They, similarly situated, would utilize sahuaro, it is true, but they would also be prone to add such substitutes as dry mescal stalks, telephone poles, tree yucca and mesquite and would, more often than not, choose one of these other sites by preference. But *lucasanus* confines itself to the cardón, at least in the district we were studying, selecting a single-stalked giant cactus and drilling its hole very near the top of the plant. As a result the nest-cavity is rather uniformly twenty feet above the ground. The entrance hole is at the top of a cavity typically five inches in diameter by fifteen in depth. No foreign material is brought in for a nest. The eggs lie on the chips that fall in the process of excavating.

The number of eggs in a clutch is two, three, or rarely four. The first two weeks of May find almost all the San Lucas Woodpeckers at the peak of laying. After the middle of the month nests with young may be expected. The parent bird will ordinarily flush, especially if his cardón be tapped, but is not very nervous about its home. It is too busy with family duties to waste much attention on strangers.

San Lucas Ladder-backed Woodpecker, 23 eggs average 22.9 x 18.1 mm.

San Fernando Ladder-backed Woodpecker, 9 eggs average 21.7 x 16.7.

Centurus uropygialis brewsteri. San Lucas Gila Woodpecker. The most abundant bird of its order, ranging throughout the territory examined. It is to be found in the suburban gardens of Santa Rosalía, among the palms of San Ignacio, and everywhere through the desert cactus belt. Its favorite choice of a home is a site high in a candelabra cardón; but it will also nest, even when not driven by necessity, in palms and tree yucca.

Its breeding season is quite long, fresh eggs being found from the latter part of April until well into June. The number laid is irregular. About half the sets are of two, but there are four's and even five's. Sixteen eggs taken in the vicinity of San Ignacio average 24.0 x 18.9 mm.

The birds are quite tame and often cannot be flushed. More than once, on opening cavities, we have lifted an adult from eggs or young, or even from an empty hole. Repeatedly a bird has been seen flying into a nest, either to feed young or to go onto eggs, while people were standing at the foot of the tree. When their homes are being examined the birds often approach within a few feet to voice their protests. Such fearlessness is unusual on this desert.

Colaptes chrysoides chrysoides. San Lucas Gilded Flicker. Like the other two members of the Picidae, this flicker is to be found, from coast to coast, as far as sahuaro associations extend. It is most common when the undergrowth is thick, as in the plains south of Santa Rosalía, the upland dry river beds, and the edges of José María Cañon. This distribution, of course, is a matter of food supply. The nesting and roosting cavities, actual or potential, are unlimited.

The birds are extremely wild, often flushing from a distance of a quarter of a mile. They lay in old cavities and, probably, also in those that are new; scarred sahuaro dries so rapidly that a definite determination on this point was not possible. The nests are usually twenty feet or more above the ground and the cavities are

generous; an eight-inch diameter and a two-foot depth are not unusual. Occasionally they will use natural openings in the cardón or holes that have been chopped open by honey gatherers.

The flickers lay from early April until well into June. The number of eggs in a clutch is normally three. With the single exception of one set of five we found none larger, and none smaller in which incubation had commenced.

San Fernando Gilded Flicker, 24 eggs average 27.1 x 21.3 mm.
San Lucas Gilded Flicker, 18 eggs average 26.3 x 20.9.

Phalaenoptilus nuttallii dickeyi. San Ignacio Poor-will.

Chordeiles acutipennis inferior. San Lucas Sharp-winged Nighthawk. These two birds may safely be accepted as breeders in the neighborhood of San Ignacio. They were present, the latter in especially large numbers, throughout the spring. We have every reason to believe that they do not lay locally until after the middle of June, and so, of course, we were able to learn nothing definite of their habits.

Calypte costae. Costa Hummingbird. This proved to be one of the most abundant birds of the cross section. Its distribution is not only peninsula-wide but also includes every association that meets its food requirements. Neither altitude nor climate affects its occurrence. In spite of its general range, however, an analysis discloses the existence of two distinct sets of breeding habitats. There are the birds of the open country and there are those of the oases. The former occur in large numbers in cactus and sage associations, just as they do in California. A few remain to nest. But diligent search resulted in the discovery of only two nests in the open desert. From that fact we infer that practically all of these birds are transients on their way north. Experience in the Vizcaino Desert and in southern California substantiates this belief.

The second group is numerically much the larger. It is concentrated in the jungles of the oases on both sides of the peninsula and is clearly composed of birds that have reached the end of their migrations if, indeed, they are not residents. They nest in the immediate proximity of surface water, sometimes snuggled into grape-vine leaves, sometimes near the tips of fig branches, but most often on the leaf stems of the date palm. The birds obviously seek and usually obtain the protection of living foliage. The sites selected average, in height above the ground, at least twice that of northern breeders; roughly eight feet against three.

The nests in the oases are built of a wide variety of materials. Plant down is the mainstay (the linings are nearly always of feathers)—sometimes only a suggestion, sometimes enough to cover the inside of the cup. On the outside are flakes of palm wood, weed bark, or sage leaves, more than one material seldom being used on any one nest, held in place with spider webs. The nests, generally speaking, do not differ from those in California so much in principle as they do in being more substantial and larger and far more carefully hidden. Thirty-six eggs from the oases average 12.2 x 8.1 mm. The season develops slowly. Early in April a few stragglers are nesting; the number increases through May and reaches its height in June.

There are before us here two somewhat contradictory sets of facts. On one hand neither Dr. Grinnell nor Mr. van Rossem has been able to separate the *Calypte costae* of California from that of San Ignacio. We know, also, that the California type migrates through this region and even stops here occasionally to breed. On the other hand there are irreconcilable differentiations in instincts and in habitat

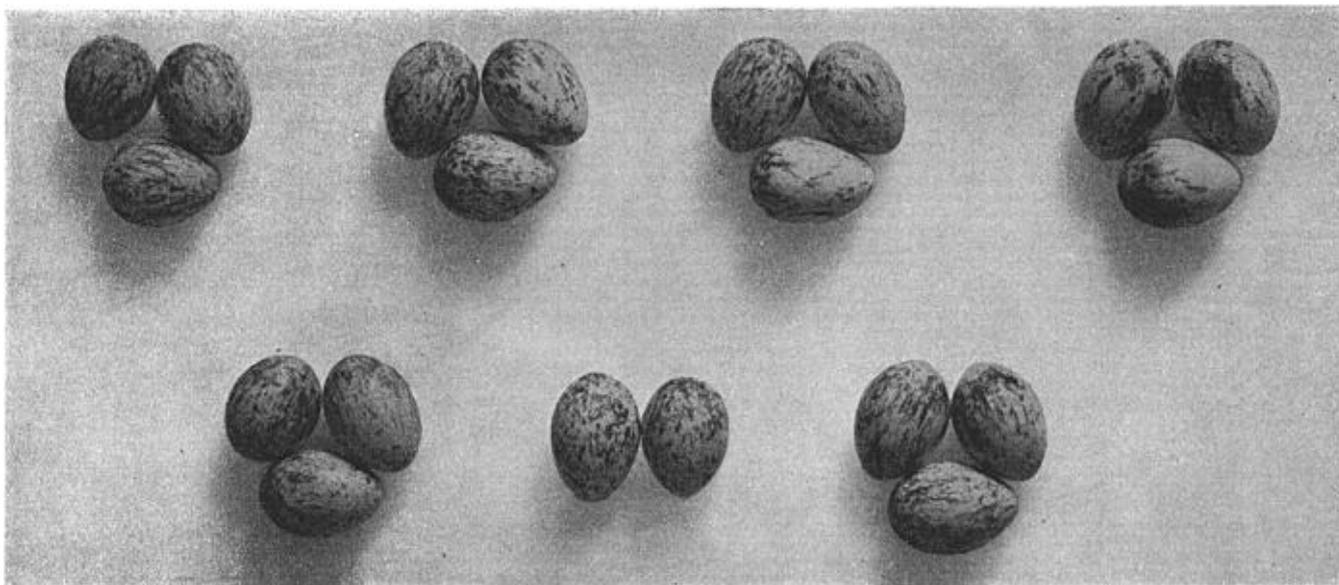


Fig. 12. SETS OF EGGS OF THE LOWER CALIFORNIA ASH-THROATED FLYCATCHER COLLECTED ON MAY 23, 1928, NEAR SAN IGNACIO.

between the Costa Hummingbirds of the two associations. The only conclusion I can draw is that we are watching an interesting step in evolution—an incipient new race that in time will attain geographical isolation and probably consequential observable differences.

***Basilinna xantusii*.** Xantus Hummingbird. This, I believe, is the rarest of the local breeders. Two birds were observed at Santa Agueda and two at San Ignacio. In the latter village a nest containing two eggs was found on April 26. It was suspended from an inner lower twig of a cottonwood, eight feet above an irrigation ditch. Four eggs of *xantusii* average 11.9 x 7.9 mm.

***Myiarchus cinerascens pertinax*.** Lower California Ash-throated Flycatcher. Quite common throughout the region. The birds prefer to spend their time on branches shielded from direct sunlight, but in doing so they do not seek concealment. They nest in abandoned holes of woodpeckers, ordinarily in those in cardón, occasionally in cavities in palm or tree yucca. The giant cactuses selected are usually in barren surroundings; these ash-throats are not lovers of thickets.

The birds take into their nesting holes enough short hairs or fur or wool to form a substantial felt pad. Once they are established they will not flush. If disturbed or threatened they remain in their cavities, making vigorous oral protests. Their laying season begins in May. Three eggs definitely constitute a clutch.

M. c. cinerascens, 31 eggs average 22.8 x 17.0 mm.

M. c. pertinax, 18 eggs average 23.1 x 17.2.

***Sayornis nigricans brunescens*.** San Lucas Black Phoebe. This little flycatcher is quite conspicuous and fairly common from Santa Agueda to San Joaquin, but we did not observe it farther west. Its breeding habits offer some striking contrasts to those of *S. n. nigricans*.

The Lower California bird has not taken advantage of civilization by adopting houses or bridges as supports for its nests. An exception might be entered in the case of uncovered wells. They were frequently used, the birds building as far as twenty feet below the surface. The San Lucas Black Phoebe wants its home to be over water and to be well concealed. Whether it accomplishes this purpose by building in rock or against an earthen bank or under projecting palm roots is a matter of secondary importance. Protection from above there must be, in all cases.

In the cup of the nest hair is not used. Shredded palm fibre and long strips of very fine weed bark are the favorite linings. Egg laying commences in March and continues at least until the middle of June. The number in a set is either three or four, usually the latter. Of the 34 eggs we measured, 7 were marked with reddish spots, 7 were very faintly marked, and 20 were plain white. Each type of marking occurred at least twice as frequently as it does on California-taken eggs.

The following measurements suggest that there is no constant difference in the sizes of the eggs of the three subspecies.

Sayornis nigricans nigricans, 45 eggs average 19.0 x 14.9 mm.

Sayornis nigricans salictaria, 13 eggs average 19.2 x 14.8.

Sayornis nigricans brunescens, 34 eggs average 19.1 x 14.8.

***Pyrocephalus rubinus mexicanus*.** Mexican Vermilion Flycatcher. Abundant from the Gulf to San Ignacio and San Joaquin, where its range comes to an abrupt termination. These birds are lovers of the irrigated oases and consequently are not averse to the presence of mankind. Their laying season begins in April and continues at least until the middle of June. Those whose nests we disturbed built and laid again within two weeks, almost always in the same tree.

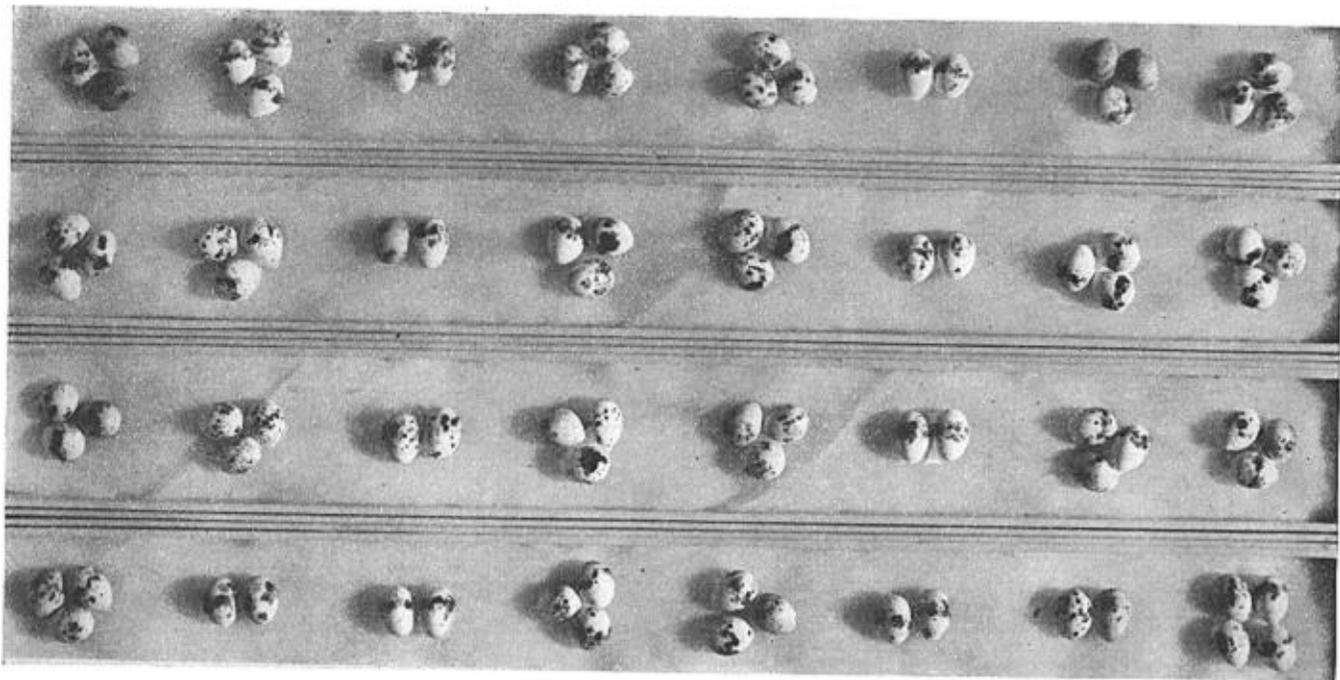


Fig. 13. SETS OF EGGS OF THE MEXICAN VERMILION FLYCATCHER COLLECTED IN THE REGION OF SAN IGNACIO FROM APRIL TO JUNE, 1928.

The favored site is a crotch in a mesquite. The nest is so small and flimsy that it must be supported laterally as well as from below. It consists of a little fringe of twigs, a shallow cup of plant down, and a lining. This last is anything from a mere suggestion to a substantial padding. It is often made entirely of the feathers of larger birds. The recesses behind the cut stubs of fan palm leaves are much used sites for nests and occasionally they are placed in grapevines, olives, or ornamental trees in the gardens. The height above the ground ranges from four to fifty feet. Normally the nests are placed eight to ten feet high and midway between the tree trunk and the tips of the branches.

The number of eggs laid is either two or three, with one set of four on record. The 103 eggs measured averaged 17.15 x 13.54 mm. The shells are usually white, though they may be cream, tan or even brown. The blotches vary in intensity and design. They are black and ordinarily overlay fainter bluish-black markings. In extreme examples the eggs are rich chocolate brown mottled with black.

Otocoris alpestris enertera. Magdalena Horned Lark. We observed no other Horned Larks and we found these only along the extremely narrow littoral on the edge of San Ignacio Lagoon. There they were quite common. The tidal border of the lagoon is so nearly level that a flat of from a quarter to a half mile in width is exposed when the waters recede. As the level of the sea goes down these Horned Larks appear in numbers on the dark hard-surfaced mud where they search diligently for small invertebrates. As far as we could ascertain these constituted their only food supply.

They are early breeders. When we worked among them on May 25, the young were on the wing and the adults were in heavy post-nuptial molt. We did not find a nest to record. Just above high water mark there are ideal nesting sites in low sand dunes supporting a scant growth of sage. There, I am sure, the birds had bred.

Aphelocoma californica hypoleuca. Xantus California Jay. The habitat of these jays is arboreal associations other than those of the oases. The level country adjoining San Lucas Lagoon in places is heavily overgrown with mesquite and palo verde. The small cañons in the mountains support scattered trees. The large valleys are frequently dotted with them, especially where moisture is not too far beneath the surface. The riparian associations are almost uniformly accompanied by the taller growths. Within these limitations *hypoleuca* is common, for a jay. Its conduct in the field is not dissimilar to that of its northern relatives, and it is but little more shy than they. It alternately hides in the thickets and comes out into the open; and it is the familiar scolding busybody, except when near its own nest.

The breeding habits of the Xantus Jay, however, are unlike those of the other races of its family, partly through choice and partly from necessity. Nearly all the nests we found were in the arrow tree whose dense growth of leaves afforded a maximum of concealment. The nest is usually in the heart of the foliage, six to ten feet above the ground. It consists of a foundation of fine twigs which support a semispherical cup. The foundation may be scanty or it may be quite pretentious, according to the requirements of its location. The cup is thin and neatly woven. It is composed of fine rootlets, tree yucca fibres, or cow-hair. It may be of one material only or the three may be used together. It is stiff enough to maintain its shape; the foundation merely serves to hold it in place.

Laying begins in April, two eggs being the usual number. Reversing the customary order, as the season progresses the size of the clutch increases until, in June, we found three more often than two. That number represents the largest

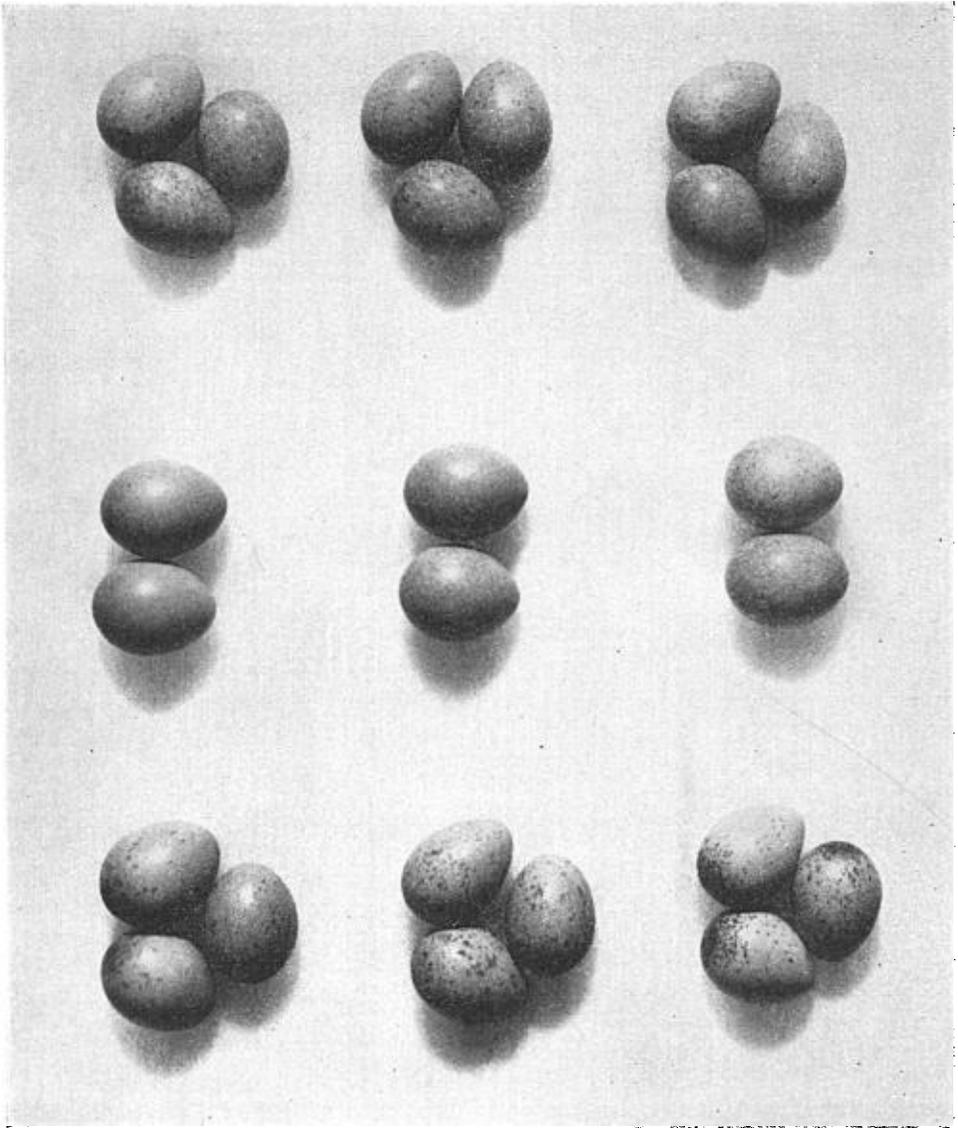


Fig. 14. SETS OF EGGS OF THE XANTUS CALIFORNIA JAY COLLECTED FROM APRIL TO JUNE, 1928, IN THE REGION OF SAN IGNACIO.

set of which we have knowledge. The eggs differ from those of any other subspecies of the California Jay in averaging a very much greener background and in being marked with decidedly finer spots. The illustration shows the small dots and also the greater rotundity, as borne out by comparative measurements.

Swarth Jay,	63 eggs	average 27.3 x 20.8 mm.
Grinnell Jay,	28 eggs	average 27.7 x 21.0.
California Jay,	48 eggs	average 27.7 x 21.1.
Belding Jay,	3 eggs	average 28.4 x 21.0.
Xantus Jay,	24 eggs	average 26.2 x 20.5.

Corvus corax sinuatus. Western Raven. Raven, vulture and caracara divide the role of scavenger. About Santa Rosalía the first two are so plentiful as to be gregarious. They haunt the offal dumps and the garbage piles, the beaches and the burro yards. The status of semi-domesticity, however, exists in this one town only. Away from its immediate environs ravens were not at all common. We did find them in unbroken sequence to the Pacific, but only a pair here and another there, at intervals usually of many miles, which hunted together and guarded their domains just as they do on California's coast.

These inland and western birds nest near their food supply. They build in a normal manner on cliffs or more often in tree yucca or multi-fingered cardón. But where the ravens were plentiful, on the eastern slope, their breeding remains a mystery. On one point we were satisfied: in spite of innumerable pitted cañon walls and cardón they do not lay near human habitation.

Icterus cucullatus trochiloides. San Lucas Hooded Oriole. These orioles are abundant locally at widely scattered points, notably at the oases as far west as San Joaquin. They are rarer in the tree yucca associations in the valleys. Their nesting season begins early in May and reaches its peak about the first of June.

The nests are built of fibre. In the oases it is taken from palms; on the deserts from the tree yucca. On the bottoms of the cups there is a pinch of white plant down, usually covered with a few strands of fibre. The nests are suspended from three or four points by threads interwoven about the support. One kind of fibre only is used in any given nest. There appear to be no exceptions to these generalities. The nests are usually built on the underside and in the middle of the lowest leaf of fan palms. We also found them, in order of occurrence, in tree yuccas, date palms, olive, fig, and banana trees.

There is no observable difference in the size of the eggs of *trochiloides* and *nelsoni*. The southern bird, however, lays fewer than the other. Two was often a complete set; three was the more usual number as well as the maximum.

Arizona Hooded Oriole, 48 eggs average 22.7 x 15.6 mm.
San Lucas Hooded Oriole, 128 eggs average 22.6 x 16.0.

Carpodacus mexicanus ruberrimus. San Lucas Linnet. A common and conspicuous bird about houses and gardens, but rare in natural surroundings. It spreads from tide-water on the Gulf to the mouth of José María Cañon. The sites most frequently chosen are on the outsides of occupied houses. Where the walls are of tule stems the linnets work their way between the upright stalks. The beams under the eaves and even the thatched roofs of adobes are also favored spots. We found many nests in olive trees and in various odd locations. On the desert, mistletoe in mesquites or flicker holes in cardón are most frequently used.

The laying season commences early in April and continues at least past the middle of June. The number of eggs in a set varies from two to four, with five on record. Clutches of three's and four's are of about equal occurrence. Weed bark in strips, gray in color and of soft texture, largely replaces stiffer materials found in northern nests.

The Mexicans quite frequently trap these birds or take young from the nests. When kept as cage pets nearly all the males lose their bright red coloration, it being replaced with dull yellow. This fact, properly interpreted, might shed light on a vexing question of chromatics. In a state of nature yellow feathers are unknown in this area.

The egg markings and shades show no constant differences. The following table shows measurements of Linnet's eggs from different localities.

Guadalupe Island,	38 eggs average 20.1 x 15.4 mm.
San Clemente Island,	36 eggs average 19.2 x 14.6.
New Mexico,	34 eggs average 19.0 x 14.2.
San Diego County,	60 eggs average 19.1 x 14.1.
Vizcaino Desert,	24 eggs average 19.1 x 14.1.
Central Lower California,	154 eggs average 18.8 x 13.9.
Guaymas, Sonora,	16 eggs average 17.8 x 13.8.

Spinus psaltria hesperophilus. Green-backed Arkansas Goldfinch. Recorded only from San Ignacio. The birds are fairly common in the gardens near the reservoir, where they begin to nest the first week in April. They build of plant down and the finest weed barks. They place their nests, by preference, in the grapevines, though it is by no means unusual to find them either in willow or in fig trees. The nests are cunningly hidden by parents wilder than any other finches within my experience. With the exception of one set of five, three eggs was the size of all the clutches we found.

20 eggs gave average dimensions of 14.1 x 11.4 mm.

Passer domesticus. English Sparrow. Resident and breeding only in Santa Rosalía. They must have reached the town by boat, either from San Pedro or Guaymas, for there is no evidence of their having come overland. They were abundant in all parts of Santa Rosalía and its suburbs and, as was to be expected, bred throughout the spring season.

Amphispiza bilineata deserticola. Desert Black-throated Sparrow. Our knowledge of the breeding habits of this sparrow is confined to two sets of two eggs each, taken the latter part of May. Both were in semi-desert, semi-riparian associations, being placed well inside thick bushes at a height of thirty inches. The nests were substantially built of long grasses and well lined with cow hair. The two eggs we collected are light blue, unspotted, and averaged 17.3 x 13.8 mm.

Amphispiza belli cinerea. Gray Bell Sparrow. We saw one bird which we procured. It was taken in the scrub brush country between José María Cañon and San Ignacio Lagoon, on May 27. The plumage was badly worn and the breeding season well in the past.

Melospiza melodia rivularis. Brown Song Sparrow. This light-breasted type of *Melospiza* occurs wherever there are pools of water with tule or willow. It breeds in Santa Aguada Cañon, at San Ignacio, San Joaquin, Álamo, and in José María Cañon. It is by no means as abundant in these localities as is, for instance, *M. m. cooperi* in the willow bottoms of southern California. Still it can hardly be regarded as rare.

The birds begin to lay the latter part of April and continue for at least six weeks. Most of the nests are bulky affairs of tule, usually lined with palm fibre or cow hair. They are normally placed in tule about four feet above the water. The one here illustrated was originally surrounded by loose and fairly long dead tule leaves. These more than equalled the bulk of the nest as photographed, but they could not be saved for the camera. Some of the nests found were in willow trees and one was in a thick weed clinging to a rock and overhanging a pool. In general, excepting the unusual size of their nests, the habits of the Brown Song Sparrow were much like those of the San Diegan form. They lay either two or three eggs, with four the record.

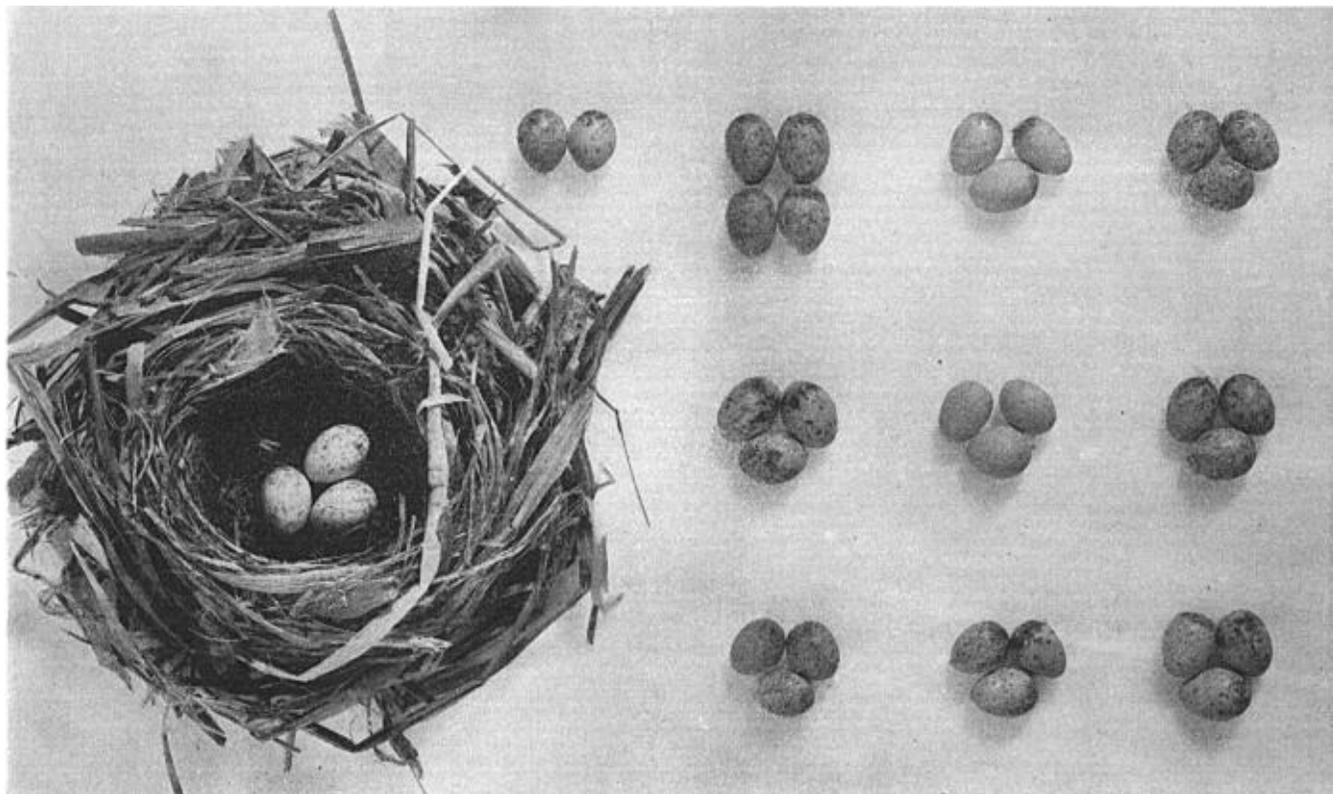


Fig. 15. NEST AND SETS OF EGGS OF THE BROWN SONG SPARROW COLLECTED FROM APRIL TO JUNE, 1928, IN THE REGION OF SAN IGNACIO.

The eggs themselves are unlike those of any other Song Sparrow I have examined. They are more brilliant than those of the northern birds, a brighter blue, and altogether lacking in the common tan type, in which the spots are so close together as to give the appearance of a reddish egg. The photograph brings out the details of all the types.

From San Ignacio, 35 eggs average 21.2 x 15.9 mm.
 From El Rosario, 250 eggs average 20.1 x 15.2.
 From San Diego County, 110 eggs average 19.9 x 15.2.

Pipilo fuscus aripolius. San Pablo Brown Towhee. Very rare and observed only in the higher altitudes, one thousand feet or more, and on the Pacific slope. It makes its home along the stream beds where the riparian arboreal growth is dense. We have convincing evidence that it breeds wherever found, but were not fortunate enough to take a set of eggs.

Richmondia cardinalis ignea. San Lucas Cardinal. A rather common bird in such a favored locality as José María Cañon; not rare in any riparian association, but not to be found, except accidentally, in palm jungles, in the open desert, or in the chapparal country. The male cardinal is aggressive and inquisitive. He loves to chatter and sing from the top of one of the small trees. If his nest is threatened he becomes a crimson meteor, swooping to defense with vociferous protests. His mate seldom appears above the bushes; she is shy and retiring and relies on the protection of her quiet colors.

There is striking contrast in the nesting sites preferred by the three races in the northwestern corner of the range of the species. About Guaymas and its environs there are great plains studded with head-high dwarf mesquite. The plants grow at wellspaced intervals and are somewhat less dense than is the sage on a typical California mesa. It is in this association and with no apparent desire for concealment or shelter that the cardinals build. They evince no aversion for more or less inhabited regions. I found one nest with three half-grown young not a hundred feet from a small settlement. These birds are indifferent to available water or riparian associations. They neither shun the thickets nor are they attracted to them, for they are typically birds of the semi-open country.

In southern Arizona, near San Xavier Mission, we found cardinals breeding quite plentifully, in June, 1923. Most of them selected the larger and denser trees and built well inside, so that the nest was carefully concealed. They frequented the thickest riparian undergrowths, where the tangle on the alluvial soil attained a height of twenty feet or more.

To our Arizona experience I attribute our lack of success in finding eggs of the San Lucas Cardinal. One set of two was all we collected. Later, when we had learned not to hunt the thick attractive growths back of the river banks, we did find half a dozen nests. By that time it was June and the laying season was past. Almost grown young were in the nests; they were surprisingly uniform in age and were always three in number. On the overhanging lateral branches of mesquite, half way from trunk to tip and four feet above the dry river beds, were the sites of these nests. The female was seldom seen, but the male, whenever a brood was approached, was a game fighter and a watchful guardian.

Pyrrhuloxia sinuata peninsulæ. San Lucas Pyrrhuloxia. Very rare in the region under discussion and perhaps unknown on the western slope of the peninsula. I have a pair of live birds which, the natives told me, were taken in 1927 from a nest near San Ignacio. In Santa Agueda Cañon pyrrhuloxias are more plentiful,

five or six having been observed there during the spring. Their distribution is inverse to that of the cardinals, though there are spots where the ranges of the two overlap. The pyrrhuloxias of the Santa Rosalía and Mulegé district average smaller than those from the Cape.

Phainopepla nitens lepida. Northern Phainopepla. These birds are plentiful in José María Cañon, but they become progressively less so as one travels eastward. They are gregarious to the extent of perhaps a dozen pairs in especially favored spots where the mesquite is at its best and food supply is exceptional. They are absent, locally, from altitudes of over a thousand feet.

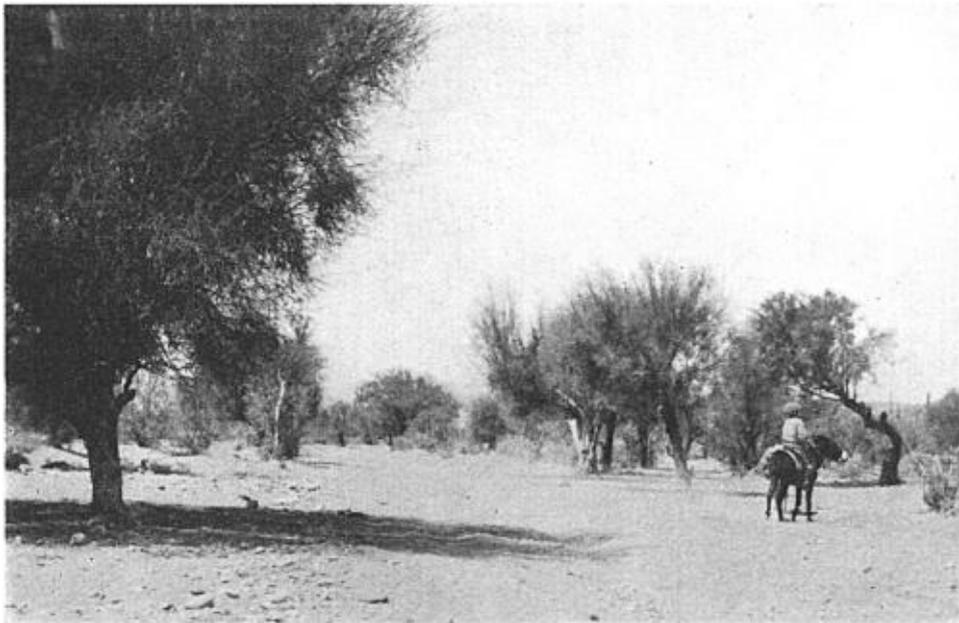


Fig. 16. MESQUITE-COVERED PLAIN NEAR SAN LUCAS AT LATITUDE $27^{\circ} 14'$ ON THE GULF COAST OF LOWER CALIFORNIA. NORTHERN PHAINOPEPLAS FREQUENTED THIS TYPE OF HABITAT.

The breeding season opens the middle of April but does not reach its height for another month. The season is six weeks later than is that of the phainopepla of the Colorado Desert, but it is slightly in advance of that of the birds of the San Diegan District. In California we expect to find the nests resting against the larger limbs of trees. In the San Ignacio region nearly all were placed in mistletoe or suspended beneath it. That condition, however, is not peculiar to this region, for I have observed the same thing near Ensenada.

The nests were typical, small and built of fine gray plant down reinforced with tiny twigs and leaves. They were ordinarily placed eight to twelve feet above the ground, though some were much higher.

The number of eggs in a set is either two or three, the latter being more common and an exception to the very general rule that the San Ignacio birds lay more sparingly than do their northern counterparts. The variations in the individual eggs,

in shape, size, and markings, were pronounced. Some were practically spherical and others extremes of elongation.

From San Ignacio to José María Cañon, 20 eggs average 22.6 x 16.5 mm.
From California and Arizona, 14 eggs average 22.2 x 16.6.

Progne subis hesperia. Lower California Purple Martin. In the sandstone associations between José María Cañon and the lagoon there is a colony of martins. It stretches for miles over rolling dunes and low cliffs. During the last week of

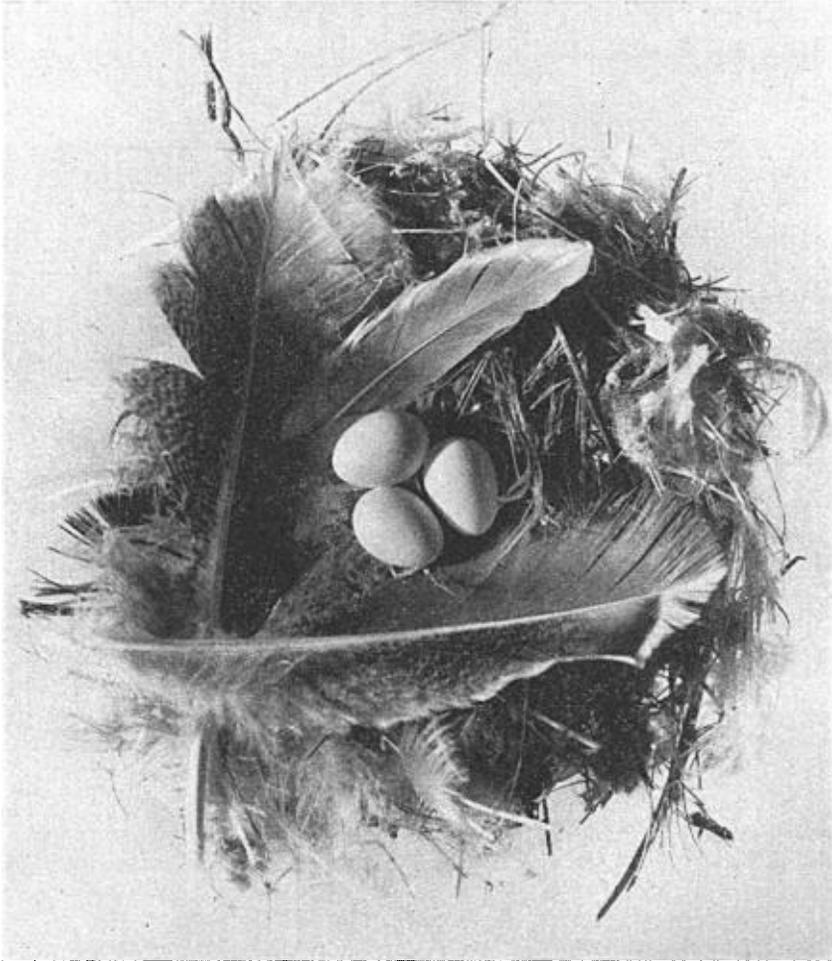


Fig. 17. NEST AND EGGS OF THE SAN LUCAS VIOLET-GREEN SWALLOW, COLLECTED ON MAY 30, 1928, AT SAN IGNACIO.

May, 1928, several hundred pairs were present. We found no nests and it was evident that the birds were not yet breeding, for among the circling insect hunters the sexes were equally represented. Early in June a few birds were in San Ignacio. These, as mated pairs, showed a decided interest in some of the woodpecker holes in the cardón, but made no further use of them.

Tachycineta thalassina brachyptera. San Lucas Violet-green Swallow. If not the most abundant, at least the most conspicuous, bird in the cross section. It fairly swarms about the reservoirs and, paradoxically, is common on all but the most sterile plains. Its breeding range includes the cardón belt.

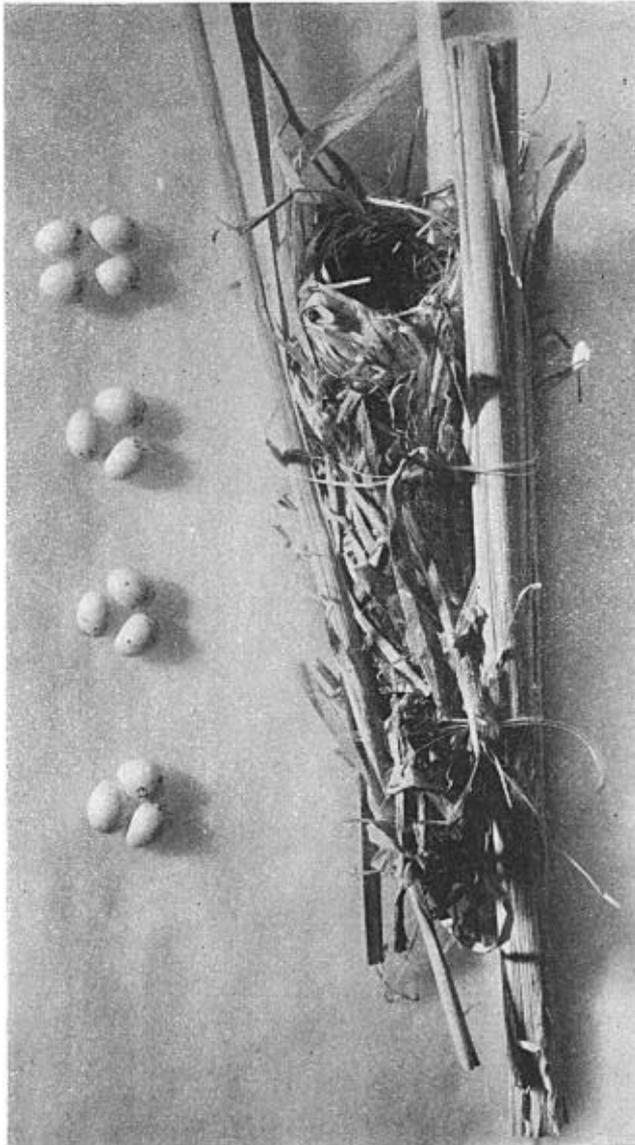


Fig. 18. SETS OF EGGS AND A NEST OF THE GOLDMAN BELDING YELLOW-THROAT, COLLECTED FROM MAY 5 TO 20, 1928, AT SAN IGNACIO.

The San Lucas Swallow breeds in woodpecker holes, preferably those near the center of the sahuaro. It makes a substantial nest of relatively large feathers; owls

appear to be a favored source of supply. The laying season begins as early as the first of May and fresh eggs are to be found throughout that month. Three is the invariable size of the clutch, as far as our experience went. That was largely based on young in the nest. The one set of three and the single egg we saved averaged 16.6 x 13.4 mm.

Lanius ludovicianus nelsoni. Nelson Loggerhead Shrike. There are shrikes near Santa Rosalia. In any small cañon which runs back from the Gulf and which also contains a few trees, three or four, perhaps a breeding pair, of these birds are apt to be found. They nest near San Ignacio Lagoon and among the sand dunes along with the Desert Thrasher. They occupy, intermittently, the terrain between these extremes, but only in associations either of low brush or of isolated trees. On the whole they are to be listed as rare birds.

The breeding season is well under way in March and does not extend beyond April. Either three or four eggs are laid, in bulky nests of tree moss. There is no lining in the cup. The building material, which is the same throughout, is itself soft enough for the eggs. Four average 24.3 x 18.2 mm.

Dendroica erithachorides castaneiceps. Mangrove Golden Warbler. Confined to the mangroves of San Lucas Lagoon. The birds are quite abundant, considering the restricted area. They put in appearance, in migration, early in May. They are included among the birds whose nests we did not find; and our only breeding record is a juvenile, barely able to fly, taken June 12, at San Lucas Lagoon.

Geothlypis beldingi goldmani. Goldman Belding Yellow-throat. Resident in Santa Agueda, San Ignacio, and San Joaquin, the only localities where there is tule. These birds do not appear to care for willow associations. They are fairly common, especially in San Ignacio, where they nest in the heart of the heaviest tule patches. Their nests are strips of dead tule leaves, well woven and tied around several living stalks. The linings show individual variations but are usually of palm fibre. The nests are decidedly larger than those of more northerly birds.

The laying season is short; we found no eggs before May 5, nor after the 20th. The eggs of *goldmani* are a dull white, heavily spotted about the larger end, but otherwise almost immaculate. The decorative scheme is complicated. There are blotches, up to a millimeter in diameter, and a few hair lines which are jet black. A majority of the spots, many three millimeters long, are so weakly pigmented that they are gray and even have a suggestion of a lavender cast. Mixed throughout are specks of either color.

The nests vary little from one another. The one here illustrated is typical, except that its tule stems should have been drawn more tightly together. The eggs show all the types of which I have knowledge. Their greater size is by no means their only specific contrast with *G. trichas*. The table of measurements is more consistent than the scarcity of material would suggest.

Goldman Yellow-throat,	13 eggs average 18.7 x 14.5 mm.
Tule Yellow-throat, El Rosario,	16 eggs average 16.8 x 13.6.
Tule Yellow-throat, California,	15 eggs average 17.5 x 13.6.
Salt Marsh Yellow-throat,	18 eggs average 17.6 x 13.1.

Icteria virens longicauda. Long-tailed Yellow-breasted Chat. In San Ignacio and San Joaquin the laying season begins about May 1, and fresh eggs are to be expected as late as the first week in June. About half the sets we found contained two eggs, the others either three or four. In their habits the birds presented no

consistent traits that differed from those of their northern relatives. They are rare; we did not account for more than a dozen pairs, and those only in the oases mentioned.

San Ignacio, 23 eggs average 22.4 x 17.1 mm.
 Vizcaino Desert, 6 eggs average 22.9 x 17.2.
 San Diego County, 30 eggs average 22.4 x 17.0.

Mimus polyglottos leucopterus. Western Mockingbird. Decidedly uncommon but widely distributed. Near San Lucas Lagoon, mixed with the mesquite, there is a thick growth of thornless trees. These are usually from six to ten feet in height. Here are about half the mockingbirds within our zone. José María Cañon harbors quite a few, as does the more heavily covered portion of San Ignacio Arroyo, just east of the town. Occasionally, but not often, isolated pairs are to be seen at other spots along the route, or even in the open desert.

The mockingbirds of this region are incredibly shy, seldom allowing approach to within a hundred yards. When their suspicions are aroused they dive into bushes and work their way from one to another, covering considerable distances without exposing themselves to view. In their breeding habits they are even more secretive. We found but one nest, it being near the western end of José María Cañon. On May 25, it contained three heavily incubated eggs. The nest was larger than those built by jays or thrashers. The foundation was of fine but rather long thorny twigs. They held a cup of stiff rootlets and plant fibres. The nest was placed, at a height of six feet, in the heart of a shrubby mesquite growing in dense riparian mesquite association. It was well hidden by the foliage of the tree and by the mistletoe above.

Toxostoma cinereum cinereum. Cape San Lucas Thrasher. These thrashers are relatively common wherever there is any considerable growth of small cactuses. Their distribution is in direct proportion to the density of the required growth. It is, therefore, peninsula-wide and unaffected by altitude or climate except in so far as those factors determine the abundance of the cactus. That growth is most dense near the ends of the cross section. It comes to an abrupt termination, together with the habitat of these thrashers, where the sand dune association begins.

Nothing has been published contrasting the breeding habits of the two forms of San Lucas Thrasher, though a comparison should be of interest. The Mearns San Lucas Thrasher (*Toxostoma cinereum mearnsi*) reaches the height of its breeding season six weeks to two months earlier than does *T. c. cinereum*. That means March and April for one and May and June for the other. They lay either two or three eggs; I have one record of four for each. The more northerly bird lays three much more often than two; the converse is true of the other thrasher. The eggs themselves are not distinguishable. They resemble those of the Bendire Thrasher (*Toxostoma bendirei*) so closely that identification is possible only from averages of color and sizes.

Mearns San Lucas Thrasher, 47 eggs average 28.1 x 19.9 mm.
 Cape San Lucas Thrasher, 92 eggs average 27.3 x 19.5.

In its conduct in the field the Mearns Thrasher is more shy, by far. It seldom allows a close approach and I have never known one to betray its nest. The Cape bird depends more on concealment and is not notably wary. It frequently hovers about its nest, and on many occasions I have flushed sitting birds at a range of a few feet. These characteristic traits harmonize with the preferred associations.

The nesting of the two birds presents the strongest antitheses. The Mearns, with but two exceptions noted, builds in cactus. There are many varieties of this

plant within its range, and they are used indifferently, flat-leaf, cholla of two or three species, and especially the pitahaya and garambulla. It is to be noted, however, that a given individual pair of these birds adheres uncompromisingly to one species of cactus. If, in the breeding season, you find an old thrasher nest and search the surrounding country you are apt to find another old nest in every satisfactory plant of the species which contained the first. If you have sufficient patience and luck you will also find an occupied nest in the same kind of plant. The normal site is on the lower and outer branches, say of a cholla, well protected from above and

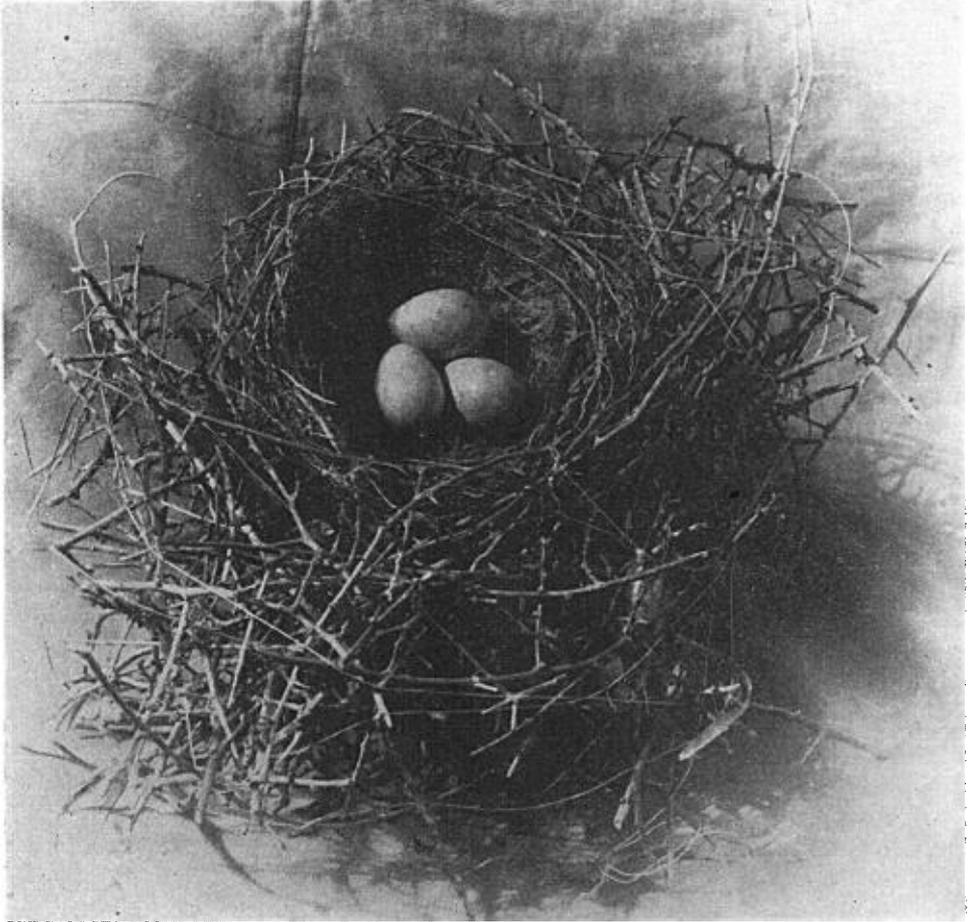


Fig. 19. NEST AND EGGS OF THE CAPE SAN LUCAS THRASHER, COLLECTED MAY 29, 1928, AT SAN JOAQUIN, IN THE SAN IGNACIO DISTRICT.

three feet off the ground. In pitahaya such sites are impracticable but are approximated as closely as possible.

The Cape bird is entirely free from these personal prejudices. It builds about half its nests in or under mistletoe, therefore most often in mesquite. It uses cholla frequently, the crotch of a cardón, or an arrow tree or other thorny growth. The same pair may utilize, in successive seasons, three or four types of sites. If in a

scrub tree it may be anywhere from the heart to the outer branch tips. It will on the average be perhaps ten feet above the ground.

The nests themselves are not very dissimilar, though those of the Vizcaíno Desert average somewhat larger and they are more substantial than the others. A good understructure of rather short and fine twigs holds a hemispherical cup. This is thicker and deeper than that of the jays and is built of thread-like rootlets. It is of the same material throughout, the only suggestion of a lining being an occasional feather, or bit of lizard skin, or perhaps a pinch of cotton.

Toxostoma lecontei arenicola. Santa Rosalía Leconte Thrasher. There comes a break in the topography of the country where the cactus and other typically desert associations give way to low sand dunes and thornless vegetation. A marginal strip of irregular width, nowhere exceeding a few miles, reflects the direct influences of the ocean. This littoral is the home of the so-called Desert Thrasher. A better understanding of its habitat may be had by appreciating how misleading is its customary name. *T. l. lecontei* is the desert dweller of the species. The "Desert" Thrasher does not wander at all into what we conceive to be the desert.

A study of old nests reveals the fact that the breeding season is long past by the middle of May. It does not begin, however, until well into March. The sites chosen are, of necessity, in small bushes, but there is a consistent preference for those which afford the maximum protection. That desire satisfied, the birds indifferently build in the heart of the shrub or near its outer edges. The foundation is composed of thorny twigs from three to six inches in length. They support a cup which, in thickness and size, is midway between that of the shrike and that of the San Lucas Thrasher. The inside walls and especially the bottom of the cavity are padded rather than lined.

The habitat of these thrashers harmonizes well with their dull gray backs and lighter underparts. They are decidedly ground-loving birds, skulking from bush to bush and seldom flying. When alarmed, unless the fright is too sudden, they run from danger. This they do with surprising speed, taking to the air only as a last resource. The southern shore of San Ignacio Lagoon is their metropolis in our cross section, but even there the birds are quite rare. In three days we saw not more than a dozen.

Heleodytes brunneicapillus affinis. San Lucas Cactus Wren. These wrens, while common, are not nearly so abundant as experience elsewhere would lead one to expect. It is not easy to define their range because, in exceptional cases, they breed among the palms of the oases as well as on the lava mesas. But in general they limit themselves to areas of intermediate fertility, shunning alike heavy undergrowth and associations of scant vegetation. That leaves them the less rocky valley floors and most of the stream beds as well as the narrowing cañons and the lateral branches running into the hills. The birds are appreciably more plentiful at the higher altitudes.

In their choice of nesting sites the Cactus Wrens indulge in a wide range of individual preference. The most popular selection is the upper part of a cholla or the center of a palo verde, but nests are not at all unusual in any low cactus, in mesquite or other trees, in heavy mistletoe, in the crotches of sahuaros, or within woodpecker holes. A formidable list could be made of unusual locations. There is, with the exception of the lining, a marked uniformity in the construction of the nests. Long fine grass stems are used as the basic material. These are woven into gourd shaped structures fifteen to eighteen inches long with the nesting cavity inside. Entrance is effected through a five-inch tunnel. The lining is almost always pro-

fuse and is usually of the feathers of some larger bird. Sometimes it is of plant down and in one nest nothing was used but native cotton.

The number of eggs laid is two. Of the many sets examined I found but one that contained three eggs. Incubated singles were unusual rather than rare. The laying season begins about April 25, in a desultory way, and is not under full head until past the middle of May.

The following table of measurements must be scanned with charity because the number of specimens is small in comparison with great individual variations.

<i>H. b. brunneicapillus</i> ,	24 eggs average 23.3 x 16.4 mm.
<i>H. b. couesi</i> , Colorado Desert,	37 eggs average 23.5 x 17.2.
<i>H. b. couesi</i> , San Diegan District,	44 eggs average 24.6 x 17.3.
<i>H. b. bryanti</i> ,	70 eggs average 24.9 x 17.1.
<i>H. b. affinis</i> ,	50 eggs average 24.3 x 16.9.

Salpinctes obsoletus obsoletus. Northern Rock Wren. Occurs only in the lower levels of the cañons running back from the Gulf. In Santa Agueda the birds were quite common in and around adobe ruins, cobble stone fences, and cañon walls. Their breeding season appears to be early; I do not believe it extends beyond March. We were not sufficiently fortunate to find a nest in our cross-section, though we have found the bird breeding both to the north and south. On the islands, San Luis and Ildefonso, the birds lay in February. That may be indicative of mainland dates.

Catherpes mexicanus punctulatus. Dotted Cañon Wren. The metropolis of this bird is the town of San Ignacio. Thence the breeding range extends east and west for several miles along the rocky stream bed. The birds are tame and have become as fully domesticated as are House Finches. For instance, our camp was in the center of town in a twenty by forty foot adobe that had a high gabled roof of palm leaves. A pair of cañon wrens made their home with us, flitting about the room unconcerned by our presence and regaling us with many hours of sweet singing. Needless to say they were not added to our collection nor was their home disturbed.

In the crevices of the old stone mission a number of these birds breed, in security and peace. They spread to adjoining buildings apparently without regard to occupancy. Two of the nests we located were in holes that had once carried wooden cross beams over adobe doorways and one was on the top cross-piece of a gabled roof. The fact that ten or twelve people lived and slept in this room in no way deterred the birds. The fourth nest was on a flat shelf, about eight by twelve inches in width, half way up the inside wall of a combined chicken and ware house.

While the nest sites were unlike those of the Cañon Wren of southwestern California the nests themselves were not. They all were soft-padded masses of animal and plant down with an occasional twig run through, the whole held together with a liberal supply of spider web. They were lined, sometimes a quarter of an inch deep, with white plant down. Often there was no lining. The larger size of the northerly clutches, averaging six, requires a correspondingly larger nest.

Cañon Wren, San Diego County,	30 eggs average 18.3 x 13.7 mm.
Cañon Wren, San Ignacio,	13 eggs average 17.9 x 13.3.

Auriparus flaviceps lamprocephalus. Cape Verdin. This is the most widely distributed and, I believe, the most abundant of the local birds. It occurs in every association of the region under discussion, excepting only the littoral sand dunes. On the lava-strewn mesas, where vegetation is barely able to maintain a foot-hold and where animal life seems almost impossible, isolated pairs of these fascinating

little workers are to be found regularly and in surprising numbers. In the irrigated river beds they seek open spots where here and there a stray mesquite or a bit of cholla has been permitted to remain. Brush-covered mountain slopes, plains dotted with cholla, cardón, and tree yucca, dry river beds supporting dense mesquite and palo verde, and cañons where the palo blanco grows are equally their home sites.

Their geographical range is unbroken from the shores of the Gulf of California to the edge of the desert, south of San Ignacio Lagoon. There is not a gap along this line from which these birds are absent. I have a nest taken on the beach near Santa Rosalía and one taken at the mouth of José María Cañon. But if they are indifferent to environment they are insistent and particular in their choice of nesting sites. Fifty per cent of the nests are in cholla, forty per cent in mesquite, and the other ten per cent scattering. The latter include anything from elephant trees to matilija poppies.

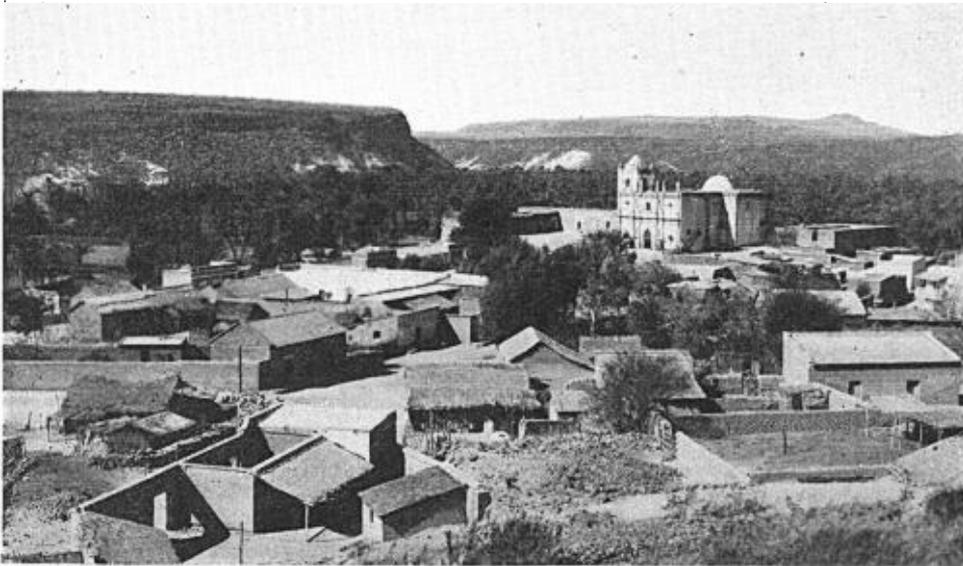


Fig. 20. SAN IGNACIO AS SEEN FROM THE MESA TO THE EASTWARD. MANY DOTTED CAÑON WRENS LIVED ABOUT THE BUILDINGS IN THIS TOWN.

The verdin has pronounced ideas as to the specifications of the plant in which it builds. On the eastern slope of the mountains there are two quite distinct forms of cholla. The smaller of these is yellow. It is compact and does not easily fall to pieces and the cattle do not feed upon it. This is, almost without exception, the only cactus the birds will use throughout the region about Santa Rosalía. Farther west, where that type of cholla becomes rarer, they are perfectly willing to accept the other variety. The mesquite, too, must fulfill certain requirements. Nine times in ten it will be a bush of from five to eight feet in height, with at least one stout sprout running well toward the top. The wreckage of old nests shows that individual pairs adhere uniformly to one type of vegetation.

The nest of the verdin is set upon the upper parts of the plant. If in cholla it is seldom so situated that a broken piece could fall upon it. There is no necessity for concealing it from enemies; even in a jay infested country it perches conspicuously

in the open, yet safe against hostile raids. If in mesquite the nest is normally as near the top of the bush and as far outside the main foliage as the strength of supporting limbs permits.

When nest building begins both birds work industriously. They find an arrangement of cholla stems in which it is possible to construct a suitable circle about five inches in diameter. They build one of fine weed twigs or of grass stems which often have leaves still attached. These inch-long bits are fastened to the cactus with a layer of plant down, the bird standing within the rim and tucking in the material with a most business-like air. The next step carries the outside super-structure backward from the ring to supporting arms of cholla. The frame is of the same material as the original circle. The builders continue to work from the inside and soon the frame becomes a shell. That, in turn, is added to and padded until a thickness of perhaps half an inch is reached.

The result is a flexible nest. In marked contrast to those of Arizona and particularly the Vizcaino Desert and Sonora it is hardly ever protected on the outside with reinforcement in the shape of thorns or larger twigs. The lining of the nest is dependent upon the preferences of individuals. Ordinarily the feathers of larger birds are used, those of quail or doves being quite typical. Near farms chicken feathers are in demand. Sometimes plant down is substituted, or even raw cotton gathered from the bolls. The lining is, ordinarily though by no means always, profuse. It may include the entire chamber to a thickness of half an inch, or it may be limited to a small deposit in the bottom.

The opening to the hollow globe is completed last. It is left just large enough to permit the entrance and egress of the parents and it is so placed as to face away from the plant on which the nest is built. It is almost level with the bottom (only once did I observe a hole squarely in the center), and it is often somewhat concealed with an overhang of building material. The interior design permits of the low entrance being safely used. The tunnel runs upward. At the interior end the wall of the nest drops abruptly or even outwardly. So the eggs lie directly below the entrance. It is interesting to note that this is not true of the nests of any other race of verdin.

Verdins have a long breeding season. They are among the first birds to lay, and they continue, with an apparently increasing frequency, throughout the season. We found their eggs in the middle of March, and there were many fresh sets when we left, the middle of June. The number laid is definitely not more than three; I have seen but one set of four out of a hundred examined. Clutches of three outnumber two in a ratio of approximately four to three. Incubated singles comprise about ten per cent of the total.

Eggs of the Cape Verdin run through a wide range of sizes, shapes and colors. Many are half again as large as the average and many are fifty per cent smaller. There is the elongated type, one end almost a hemisphere and the other a cone-shaped point. On the other hand it is not rare to find them as perfectly elliptical as the typical hummingbird egg. The ground color is green, the markings gray—facts established for us by an oculist with the proper instruments. The shade of green varies until almost blue is reached.

Polioptila melanura margaritae. Santa Margarita Black-tailed Gnatcatcher. Widely spread and decidedly common. There was no association and no region where the presence of a pair of these little scolds could not be expected. They were most plentiful west of José María Cañon. They seemed equally at home in the thickest

brush and on the most open plains. Yet we found only five occupied nests and were able to save but one set of eggs.

The nests are cups, rather thin and quite deep. They are so extremely neat and trim and blend so well into the background that it is difficult to see them, the first time. They are usually placed in the center of some sage-like bush about three feet from the ground. They rest on both a lateral and a horizontal branch. One exceptional site was the heart of a mistletoe in a mesquite, well hidden by the parasite, at a height of twelve feet.

Fresh eggs are most numerous about the middle of May, and the season is exceptionally short. The number in a clutch, within our limited experience, was three.

San Diego, California, September 8, 1929.