

*S. pusilla arenacea* (average of two specimens), tail, 2.88; wing, 2.52.

*S. pusilla* from Texas (average of ten specimens), tail, 2.86; wing, 2.61.

*S. pusilla* from Massachusetts (average of ten specimens), tail, 2.62; wing, 2.43.

*S. wortheni* (type specimen), tail, 2.60; wing, 2.68.

Through the courtesy of the National Museum I have been able to examine the type of *Spizella wortheni*, and I find that it has no trace whatsoever of the median stripe through the crown, or of the chestnut auriculars; there is but one wing-band, and the general effect is as dark as in *S. socialis arizonæ*. The wing is also longer and the tail shorter than in the new race. In short, the two birds seem to have no close relationship.

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## ON THE AVI-FAUNA OF PINAL COUNTY, WITH REMARKS ON SOME BIRDS OF PIMA AND GILA COUNTIES, ARIZONA.

BY W. E. D. SCOTT.

*With annotations by J. A. Allen.\**

### I.

By referring to a map of Arizona the reader will see that Tucson lies on the 111th meridian west of Greenwich and on the 32d parallel of latitude north. The country under consideration in the present paper extends north of Tucson eighty miles, and south forty miles; and, taking the 111th meridian as a median line, twenty-five miles each side of that line gives about its east and west boundaries. This area is therefore one hundred and twenty miles long, in a north and south direction, and fifty miles wide, from east to west. In this parallelogram are one

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\*A large part of the collection (some 2400 specimens) on which Mr. Scott's paper is based is now in the possession of the American Museum of Natural History, and many other specimens have been submitted to me for inspection. The large series of specimens thus brought together frequently present special points of interest, and the remarks based thereon in the subsequent papers of the present series are added by the kind request of Mr. Sectt.—J. A. ALLEN.

large and two smaller rivers, the Gila being the former and the Santa Cruz and San Pedro the two latter.

Practically one mountain range, the Santa Catalina, forms the backbone of this region. Rising abruptly to the northward and eastward of Tucson, at a distance of from fifteen to twenty miles, it extends in low hills to the Gila River, on the opposite side of which, directly north, are the Mescal Mountains, which terminate in the Pinal range. To the west of Tucson there are no mountains proper in the area under discussion, but very considerable hills break the great plain, and the Barboquivori Mountains are reached at the extreme south-western border. On the southern edge of the area is the Santa Rita range, which is far the most imposing in appearance, though in altitude its highest peaks, as well as those of the Santa Catalinas, do not much exceed eleven thousand feet. Here much work has been done by Mr. H. W. Henshaw, and also by Mr. F. Stephens. I mention this to show the connection of the lists published by these gentlemen with the remarks I shall have presently to offer.

The several points at which most of my material was obtained are Tucson, Florence, Riverside, the San Pedro slope of the Santa Catalinas, and the headwaters of Mineral Creek, which is just outside of Pinal County, in Gila County. In addition, many notes and items have been accumulated on rides and drives between these various points, and now and again specimens procured on such journeys, where anything of special interest happened to occur.

Let me now briefly describe the general environment of each of the places above mentioned, in order to introduce to those of my co-workers who have not been in this region some of the more salient characteristics that obtain here. To make this more clear and intelligible, a map is presented showing some of the great physical features of the country, and to this constant reference will be made in the following pages. The map is based on one compiled for the use of the General Land Office of the United States, in 1879, under J. A. Williamson, Commissioner.

The region about Tucson, it will be noticed, is a great plain, the altitude of which above the sea does not vary greatly from 2300 feet. During many months of the year this plain is arid, but in the region watered by the Santa Cruz River, cultivation by irrigation is largely pursued; and the same remarks apply to



the land immediately in the vicinity of the Rillita, a small stream rising in the Santa Catalina range, and running through the Camp Lowell Military Reservation. It is important to notice in this connection that both of these streams only rise to the surface in places, and except in the spring of the year their course is not continuous, but more like a series of streams that vary from a few yards to several miles in length. For instance, the Santa Cruz River is continuously a considerable stream for at least fifteen miles south of Tucson. About two miles below the town it disappears, rising only in occasional small pools, until the Nine Mile Water Hole is reached, where the stream again comes to the surface, and soon afterward is lost again in the desert between Tucson and the Gila River, which stream it ultimately joins. On the other side of the town, and some fifteen miles east, the Rillita, a small stream, flowing down from the summit of the Catalinas, enters Sabino Cañon. In the spring it is continuous from its source to Camp Lowell, but beyond the Military Reservation to the westward it is lost almost at once; though its course may be plainly traced by the dry bed of the stream, no water is to be seen, except in time of great freshets, until it joins the Santa Cruz at the point indicated on the map.

The vegetation of the great plain of Tucson is as varied as one would naturally look for in a region at points well watered and at others almost a desert. Along the two streams mentioned are fine growths of cottonwood and sycamores, the former green almost the entire year, with occasional black walnuts and alders. While the mesquite is found at intervals, throughout the plain, the finest growth is perhaps near or in the region immediately adjoining the streams; and a grove of these trees of special beauty is to be found on the Santa Cruz River, where that stream passes through the Papago Indian Reservation, south of Tucson.

For long stretches on the more arid portions of the plain are found a number of varieties of cholla, a kind of cactus, reaching often the dimensions of the largest shrubs, or smaller trees. It is perhaps needless to add that they are much branched, and wonderfully repellent with their thousand spines, ready to resist the slightest intrusion; yet they form almost the exclusive nesting place and home of a number of species of birds, as will be presently recorded. Such growths are to be met with particularly just outside of Tucson to the eastward.

Wherever the plain is broken up into small hills, at the beginning of the larger mountains beyond, and sometimes reaching well into the plain itself, the giant cactus is abundant, and though it is quite as common in the most arid country, yet it seems to flourish equally near the streams. The groves of this form of cactus are sometimes of vast extent, and such a one exists just east of the Military Reservation of Camp Lowell. Here the cacti attain wonderful size, many being between twenty-five and forty feet high, and are very close together, the outstretched arms of one not unfrequently almost touching its neighbors. They are of the most wierd shapes, varying from a single straight shaft to a most complicated system of branches or arms, reaching in every conceivable direction. The many trunks and arms are from ten inches to three feet in thickness, and have parallel rows of the sharpest spines protecting them, yet the soft fibre of which these colossal cacti are formed is often riddled by the Woodpeckers, and the holes thus made serve afterward, in other seasons, as admirable nesting places for several kinds of Owls and Flycatchers of the genus *Myiarchus*. Two other forms of plant-life, very characteristic of the region, are generally found in the same region as this giant cereus. One is the palo-verde, a peculiar tree, deserving its name from the intense green of the entire bark from the ground upward, and bearing leaves so small that the tree presents an appearance little varied during the year, save in the spring when it blooms with myriads of minute yellow flowers, that give the appearance of a tree of gold. These trees vary in size from small shrubs to trees of twenty-five feet in height, and are found most abundantly, perhaps, on the first mesas of the foothills, and at other similar altitudes. The other form spoken of is the ocotilla, a large kind of *Euphorbia*, bearing in the spring and early summer from the extremity of each of its branches a cluster of vivid scarlet flowers. There is no trunk or body proper to this shrub, which frequently attains a height of fifteen to twenty feet, but the arms or branches start close to the ground from the root stalk, at an angle of about 45°, and rarely send off any smaller branches.

All of these forms of vegetable life, save the cacti and ocotillas, afford sustenance to great bunches of mistletoe—of course ever-green—the fruit of which forms the favorite food of many kinds of birds, and in its deep, tangled masses numberless bird houses are

built. These are the principal forms of trees and shrubs characteristic of the great plain of Tucson, but there are many others too numerous to bring into consideration in the present papers.

The region of the valley of the Gila River at Florence is very similar to that about Tucson, though the mountains are lower and more distant, while the plains back from the river valley proper are more broken, and generally a little higher in average altitude. The road leading to Riverside from Florence passes through this arid plain, and by a gradual ascent reaches the low mountains west of the former place. The plant and tree forms already described are very characteristic of this entire route, and are very abundant the whole way, until reaching the summit of these low mountains. Here the most conspicuous forms are several kinds of yucca, and the aloe (*Agave americana*) or mescal plant, all of which are common. After passing the summit the road again descends into the valley of the Gila, passing through a hilly region cut by many large arroyas, most of which during the rainy season become running streams. The plants of these low hills are chiefly the different forms of mesquite, but the giant cactus is everywhere present.

The valley of the Gila at Riverside is very narrow, high hills and mountains rising abruptly on either side. The Mescal Mountains to the north of the river are really the higher foothills of the Pinal Range, and the lower hills to the south are offshoots of the Santa Catalina Range. Along the river banks are great groves of cottonwoods and sycamores, and back of these a growth of mesquite and cat-claw, running almost immediately into a mixed vegetation consisting of palo-verde, mesquite, giant cacti, chollas, prickly pears, and ocotillas, the valley beginning to break into low hills and mesas just a little back from the river's edge. The altitude of Riverside, as given by the government survey, is about 2200 feet.

The region at the headwaters of Mineral Creek has an altitude approximating 5000 feet. It is some six miles to the eastward of the divide made by the summit of the Pinal Mountains, where collections were made. Here are some large isolated cottonwoods, many sycamores, and on the small plains and mesas varieties of cat-claw and mesquite; junipers of considerable size form groves, and a variety of the hackberry tree is not uncommon. The flow of water in Mineral Creek is even more desul-

tory than in the Rillita, and it rises permanently to the surface only at isolated points, in the form of springs or water holes.

Having described with so much detail the region of the San Pedro slope of the Santa Catalina Mountains in former papers (see *Auk*, Vol. II, 1885, pp. 1 and 243) it seems hardly necessary to do more here than direct attention to them. To recapitulate briefly, the mountain range is here very wide, the foothills extending far down—for at least eight miles—from the summit of the main range. These hills, though generally abrupt on the sides, are flat on top, thus forming mesas or tablelands of greater or less extent, one ranging above the other. The cañons between these hills are narrow and deep, and in rainy seasons there is a more or less continuous flow of water through them. The cañon in which my house is situated has been alluded to before as having for a considerable distance an ever flowing stream of water.

To return to the consideration of the area as a whole, there are two well defined rainy seasons. One, beginning early in December and lasting till about the middle of March, is a period of storms rather than a rainy season proper. These storms consist of rain or snow, according to the altitude, but snow is of so rare occurrence on the plain of Tucson, that I can find but one record of a snow storm having reached that locality during the past ten years. This season properly corresponds to the winter of the East. It is succeeded by a period of spring, when the deciduous trees regain their foliage, the plains become green and brilliant with wild flowers. In June, most of these grasses and flowers have ripened and died, and the plain is again brown and withered; and save for the scorching heat and the green leaves of the trees, the country has the appearance of winter. This season lasts for from six weeks to two months.

The second rainy season begins generally rather late in July. The rains are then of almost daily occurrence, beginning soon after mid-day and clearing during the night; are almost always accompanied by thunder and lightning, and continue for from three to six weeks. Coincident with this season of rain is a second spring time, when the grass becomes much more luxuriant in its growth than in March and April, and the flowers quite as abundant, but of more enduring varieties. Some of the larger plants, too, as the ocotilla, having lost their first leaves

during the period of heat, now regain them, and sometimes flower again.

The winds are at times during the wet seasons, particularly in the winter, very violent, both in the mountains and on the plains; and even during the intermediate dry intervals, which comprise a series of cloudless days. There are, especially during the early spring, severe storms of wind, accompanied by clouds of dust and fine sand, in the more arid country. The atmosphere is peculiarly dry and clear at all times, save when rain is falling, but is perhaps most noticeably so directly after a rain or wind-storm.

The temperature on the plains ranges from about 28° Fahr. in the coldest of the winter days to 115° in the summer. These figures, of course, indicate the great extremes. At the point where my house is, in the mountains at an altitude of 4580 feet, the mercury has once this winter (1885-86) reached 18°, but this was on the occasion of a storm of unusual severity. The average temperature here of the winter months is about 50°, and of the summer months 85°.

The Pinal, Santa Catalina, and Santa Rita are the only ranges which have pine forests, and these prevail only at the higher altitudes. The characteristic feature of the vegetation below the pine forests is a belt of evergreen oak, which extends down to a little below 4000 feet on the northern, and not much below 4500 feet on the southern slopes.

The birds of this area, as a whole, may be divided into groups which are partly connected with the three greatly differentiated regions here discussed, namely: birds of the valleys and plains; birds of the oak belt; and birds of the pine regions. Though many species range at different times of the year in common over all of these districts, yet there are others, both resident and migratory, which I have never seen outside of the single area they affect. For instance, Bendire's and Palmer's Thrashers are not to be encountered outside of the valleys and lower plains or mesas. Strickland's Woodpecker and the Arizona Jay are always associated in my mind with the oak belt, for I have never met them beyond its limits; and Grace's Warbler, the Red-fronted Warbler, and the Mexican Crossbill are in the same way, so far as I am aware, confined to the pine woods. Yet of these birds—and all are met with near my house, the extremes being not more than



eight miles apart—Bendire's Thrasher is migratory, while many Palmer's Thrashers are resident; Strickland's Woodpecker is migratory, and the Arizona Jay resident; the two Warblers are strictly migratory, and the Crossbill resident. It will be my effort, therefore, to indicate, in as much detail as possible, the distribution locally of at least the more characteristic species.

The migrations here must be considered as occurring regularly in two ways, primarily a north and south migration, and secondarily, though of almost as much import as the other, a vertical migration. There are many species that doubtless come under both heads, but there are others that are as clearly to be classed in the one or the other of these two categories. For examples of each, reference may be made to the details regarding each species which are to follow.

The breeding period of most species, even in the same locality, is prolonged; and though the number of young in a single brood is limited in many species to two or three, it seems probable that in such species the usual aggregate is reached through the greater number of broods raised, which, in cases to be noted, is at least four during a season. Breeding fairly begins by the middle of February, and of birds nesting then, I have found also freshly laid eggs as late as the first of July. The season of breeding in other species which begin to nest later lasts till late in August.

The collections I have made in this area aggregate a little over four thousand birds. At Florence and Riverside, and in the vicinity of these places, in the spring of 1882, four hundred birds were collected and notes made on that part of the territory. At Mineral Creek, in October and November of the same year, about six hundred birds were added. On the San Pedro Slope of the Santa Catalinas, and incidentally in the valley of the San Pedro, and in the pine forests of the Santa Catalinas, during the past two years, somewhat more than three thousand birds have been obtained; and most of the data in regard to migration, nesting period, and the like have been acquired in this region. Though collections have been made in rather a desultory way, at various times and for short periods, about Tucson, and though constant travel in the vicinity has led to the record of many observations, yet I am greatly indebted to Mr. Herbert Brown, of that place, for many notes on species not met with by me, and for much valua-

ble information on the subject in hand, which I shall always mention in connection with his name.

Finally, all the species recorded in the succeeding papers have actually been obtained by either Mr. Brown or myself, and though a number met with by other workers in the same field have escaped our united efforts, the list will be found to embrace several birds not before recorded from Arizona.

(To be continued.)

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## THE RED CROSSBILL (*LOXIA CURVIROSTRA STRICKLANDI*) IN KANSAS.

BY L. L. DYCHE.

WHILE walking along one of the streets near the State University, Lawrence, Kans., on November 1, 1885, I observed a flock of about twenty plump little birds, about the size of English Sparrows. They were hopping about the road, apparently picking up particles of food. Occasionally they would utter a few chirps and fly to a low tree just over the fence, but only to return and alight in the road again. Some of the birds were red, with dark wings, others were of a gray color showing yellowish green blotches. At that moment, while I stood gazing under the influence of the electrical shock of ornithological pleasure produced by my rare discovery, two gentlemen happened to be passing on their way to church. I pressed them hard with the scientific importance of the situation, and insisted on their watching the birds while I rushed for my gun. I returned in less than five minutes and found the men diligently watching some Sparrows in an old tree near by. I mourned this grievous mishap until November 5, when, during a drizzling rain storm from the northeast, I again observed the birds, apparently the same flock, in the top of a tall tree near the University campus. I was so fortunate this time as to secure four good specimens, two males and two females.

HABITS OF THE BIRDS.—The birds remained in this vicinity (apparently within a mile or two of the University grounds) until