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ABSTRACT

OF THE PROCEEDINGS OF THE

LINNÆAN SOCIETY

OF

NEW YORK

For the Years Ending

March 14, 1916

AND

March 13, 1917

CONTAINING

Natural History Observations from the Mexican Portion of the Colorado Desert. By ROBERT CUSHMAN MURPHY

Date of Issue, December 11, 1917

Officers of the Linnæan Society

OF NEW YORK

1915-1916

President	Jonathan Dwight
Vice-President	Julius M. Johnson
Secretary	Charles H. Rogers
Treasurer	Lewis B. Woodruff

1916–1917

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The Society meets on the second and fourth Tuesday evenings of each month, from October to May inclusive, at the American Museum of Natural History, 77th Street and Central Park West, New York City.

ABSTRACT

OF THE PROCEEDINGS OF THE

LINNÆAN SOCIETY

OF

NEW YORK,

FOR THE YEAR ENDING MARCH 14, 1916.

THIS is the twenty-eighth in the series of *Abstracts* published by the Linnæan Society of New York, and, like the preceding issues, is prepared mainly as a brief review of the work of the Society during the year closing with the date indicated above. Papers presented before the Society and published elsewhere (often enlarged or otherwise different in form) are mentioned with proper reference to the place of publication.

March 23, 1915.—The President in the chair. Fourteen members (Dr. Dwight and Messrs. Chubb, Cleaves, Granger, Hix, Hollister, Hubbell, J. M. Johnson, Kieran, Marks, Nichols, Rogers, Taubenhaus and Weber) and twenty-two visitors present.

The name of Mr. Francis Harper, of the Brooklyn Museum, was proposed by Dr. Dwight for Resident Membership; it was referred to the Membership Committee.

The President appointed, to serve for the ensuing year, standing committees as follows:

Publication, Messrs. Rogers, Nichols and J. M. Johnson.

Papers and Lectures, Messrs. Granger, Murphy and Rogers.

Nominations, Messrs. J. M. Johnson, Hubbell and Weber.

Finance, Messrs. Woodruff, Granger and Weber.

Bird-Banding, Messrs. Cleaves, Nichols and Rogers.

Mr. Cleaves recorded at Princes Bay, S. I., March 13, Spring Peepers (*Hyla crucifer*) in song; and a Woodcock (*Philohela minor*), three Wilson's Snipe (*Gallinago delicata*) and three Killdeer (*Oxyechus vociferus*) there on the twenty-first.

Further discussion of the migration showed that owing to the long-continued cool weather and northwest wind comparatively few migrants had arrived. Song Sparrows (*Melospiza m. melodia*), Robins (*Planesticus m. migratorius*) and Bluebirds (*Sialia s. sialis*) were still only locally common and no Phœbe (*Sayornis phœbe*) had been seen.

Mr. Rogers reported that on March 21 he and Mr. J. M. Johnson had found a Barn Owl (*Aluco pratincola*) at Teaneck, N. J., roosting not in the Phelps ruins but in a small pine grove adjoining. But few rods away in the same grove was a Barred Owl (*Strix v. varia*). The quantities of pellets, etc., indicated that both roosting sites were in regular use. The Barred Owl was in addition to two found at the well-known roost a half-mile to the east.

Mr. Carl E. Akeley presented the paper of the evening, "The African Elephant." Mr. Akeley, illustrating his talk with lantern-slides, gave a detailed account of many of the habits of this species (*Loxodonta africana*) and of some of his experiences with it, for in his many years of hunting in Africa a great part of his time had been devoted to following, studying, photographing and collecting this largest of terrestrial animals.

April 13, 1915.—The President in the chair. Fourteen members (Dr. Dwight and Messrs. Cleaves, Harper, Heller, Hix, Hollister, Hubbell, F. W. Hyde, J. M. Johnson, Marks, Pangburn, Rogers, Taubenhaus and Weber) and three visitors present.

Mr. Francis Harper, whose name had been proposed at the preceding meeting, was elected to Resident Membership.

Mr. Harper told of the finding of a Great Horned Owl (*Bubo v. virginianus*) nest by Dr. Overton at Patchogue, L. I., and how Dr. Overton had been severely clawed about the head and shoulder by the defending Owl. He had secured several excellent photographs of the bird, which Mr. Harper exhibited.

Mr. Johnson stated that he had seen what he believed to be four Fish Crows (*Corvus ossifragus*) at Greenfield, Mass., April 2. He had repeatedly heard their call, with which he is familiar, uttered in ordinary flight.

Mr. Hubbell and Mr. Marks spoke of birds they had seen recently at Greenwich, Conn., and Putney, Vt., respectively. The most interesting occurrence was the whistling of a Bob-white (*Colinus v. virginianus*) at Greenwich as early as April 11; Mr. Hubbell said he had rarely heard one before May.

Discussion of the migration showed that in the continued cool weather culminating in the 10-inch snowfall of April 4 few birds arrived, but there was a big wave in the ensuing warm week, so that by Sunday the 12th the migration was about up to schedule, or even (as in the case of three Towhees (*Pipilo e. erythrophthalmus*) seen in Central Park on the 12th by Mr. Hix) a bit ahead.

Mr. Weber told of the cutting of a patch of timber above Palisades Park, N. J., last summer, and how quickly certain birds not previously seen above the valley had appeared there, as Grasshopper Sparrow (*Ammodramus savannarum australis*) and Yellow Warbler (*Dendroica æ. æstiva*) last autumn and Vesper (*Poœcetes g. gramineus*) and Chipping (*Spizella p. passerina*) Sparrows already this spring.

Mr. Harper described a habit he had noticed in Loons (*Gavia immer*) and American and Red-breasted Mergansers (*Mergus americanus* and *M. serrator*) in Saskatchewan and Mackenzie last summer. A bird on the water would immerse its face just enough to put its eyes below the surface and frequently follow this action with a dive, so that Mr. Harper supposed that it was doing this in order to avoid the surface reflection and ripples in looking for fish.

Mr. Rogers reported the safe arrival in New York of Mr. James P. Chapin, who had been absent nearly six years on the American Museum's expedition to the Belgian Congo. The expedition had collected everything from insects to anthropological material. Mr. Chapin had brought home about a quarter of the whole, including hundreds of small mammals and nearly all of the six thousand birds, some new to science.

Mr. Rogers showed several skins and called attention to how beautifully they were made up and to the fulness of the data.

Mr. Harper introduced Mr. H. M. Laing, of Manitoba, and Mr. Laing passed around a large number of splendid photographs, taken by him in recent years of Sandhill Cranes (*Grus mexicana*), Sharp-tailed Grouse (*Pediœcetes p. phasianellus*)—some dancing, and clouds of Snow Geese (*Chen*).

Mr. Taubenhaus exhibited a live Rattlesnake (*Crotalus horridus*) he had had for some months in captivity, and allowed the members to handle and examine it, as much as they desired. He told of several places within fifty miles of the City, notably the Ramapo district and Newfoundland, N. J., where Rattlers were still to be found, and described many interesting features of the structure and habits of the species which he had noted in several years' observations.

April 27, 1915.—The Vice-President in the chair. Nine members (Messrs. Cleaves, Davis, Harper, Hix, J. M. Johnson, LaDow, Marks, Pangburn and Rogers) and eleven visitors present.

Mr. LaDow reported four Canada Geese (*Branta c. canadensis*) seen by him and Mr. Lenssen on the Overpeck Creek in the Englewood Region on April 25.

Mr. Davis said that he had seen on the 25th on Long Island, north of West Hills, a Chipping Sparrow (*Spizella p. passerina*) with the head entirely white and that a resident had told him of seeing the same bird last summer. Mr. Davis also showed a photograph of a Great Horned Owl (*Bubo v. virginianus*) kept in captivity in that vicinity; the bird had been taken young in 1910 and was said never to drink.

Mr. Johnson had visited the owl grove at the Phelps Ruins near Teaneck, N. J., on April 24 and 25. On the 24th he saw the Barn Owl (*Aluco pratincola*) in the tree where he had last seen the Barred Owl (*Strix v. varia*), but saw no Barred, and next day he saw the Barred Owl in the Barn Owl's former tree, but saw no Barn. He had also seen a pair of Wood Ducks (*Aix sponsa*) in swampy woods near West Englewood on the 25th and heard a Louisiana Waterthrush (*Seiurus motacilla*) give a whisper song. The bird was on the ground and the

song carried but four or five rods and was much longer and more elaborate than the usual one.

Mr. Rogers recorded an early Solitary Sandpiper (*Helodromas s. solitarius*) seen by Mr. W. DeW. Miller, Mr. J. M. Johnson and himself along the Dead River, a tributary of the Passaic, April 18. Later in the day the party visited a Great Horned Owl (*Bubo v. virginianus*) nest on the Third Watchung Mountain near Mt. Horeb and found the one remaining young bird perched near the ground a few yards from the nest. That it had flown at this date meant that the eggs must have been laid about February 20.

Mr. Alanson Skinner was the speaker of the evening, and his title was, "In my Grandfather's Wigwam." He had been adopted by a chief of the Menominee tribe of Indians and had spent many weeks with the tribe and had heard great numbers of the stories told in front of the fire in his grandfather's, or, more correctly speaking, his uncle's lodge, and others. He now gave the Society a selection of these stories, told Indian fashion, and chosen especially from those relating to birds and other animals.

May 11, 1915.—The Vice-President in the chair. Thirteen members (Messrs. Cleaves, Fleischer, Harper, Hix, Hollister, F. W. Hyde, J. M. Johnson, Lemmon, Marks, Pangburn, Rogers, Taubenhaus and Weber) and two visitors present.

The Secretary read the report of the Auditing Committee, that they had examined and found correct as stated the Treasurer's Report for 1914–'15.

Mr. Weber reported that he had received a Puffin (*Fratercula a. arctica*) that had recently been picked up, some weeks dead, on the beach at Montauk, L. I. Mr. Weber himself had on the morning of the meeting collected at Palisades Park, N. J., a male Black-throated Blue Warbler (*Dendroica cærulescens*) with even more black on its back than typical *cairnsi*. He said that he had one or two others in his collection that from their color would be referable to the southern form.

Mr. Pangburn recorded from New Haven, Conn., a male and a female Tennessee Warbler (*Vermivora peregrina*) May 8 and a male the following day.

Mr. Fleischer told of watching at Northport, L. I., on April 1, the attempt of a Herring Gull (*Larus a. argentatus*) to rob a Loon (*Gavia immer*). The Gull was darting at the Loon, which was on the water and had a fish in its bill. The latter bird dived repeatedly till the Gull gave up and went away, then swallowed the fish.

Mr. Johnson recorded an eagle, most probably a young Bald Eagle (*Haliœetus l. leucocephalus*), flying over the Leonia, N. J., marshes, May 2.

Mr. Hix reported Greater Yellowlegs (*Totanus melanoleucus*) at Englewood May 8 and a flock of nine in Central Park next day. He said that American Goldfinches (*Astragallinus t. tristis*) were unusually common in Central Park this spring and that a Sapsucker (*Sphyrapicus v. varius*) was still present May 10.

Mr. Rogers said that he and Mr. Marks had seen a flock of seven Canada Geese (*Branta c. canadensis*) at Lyde Park, near Westfield, N. J., May 2; they were flying over rather low and disappeared to the southeastward.

Mr. Fleischer told of the breeding of Black Ducks (*Anas rubripes*) in Prospect Park the past two years and stated that more birds were in the flock this spring.

Mr. Weber gave a brief account of studies he had made at different times of young chickens (*Gallus gallus*, domestic) and turkeys (*Meleagris gallopavo*, domestic). He had come to the conclusion that most of their conduct was the result of instinct and that they learned very little by imitation or otherwise from their parents.

Mr. Rogers raised the question of abbreviations in field notebooks and explained the list of those used by himself. Considerable discussion followed.

May 25, 1915.—The Treasurer in the chair. Fourteen members (Messrs. Chapin, Cleaves, Fleischer, Granger, Harper, Hix, Hollister, LaDow, Lemmon, Marks, Pangburn, Rogers, Taubenhaus and Woodruff) and twenty-one visitors present.

Mr. Hix reported Myrtle Warblers (*Dendroica coronata*) still in Central Park May 24, and Mr. Rogers a White-throated

(*Zonotrichia albicollis*) and a Swamp (*Melospiza georgiana*) Sparrow May 25.

The rainy weather on Sunday, May 16 (it showered much of the morning), coupled with the fact that that day was not so much the height of the big wave as was the corresponding Sunday last year, kept down the number of species seen by members on the annual try for a big list. Mr. Hix said that he and Mr. Edward Desvernine in seven hours in the field in the Dead River district, N. J., had noted 74 species, including Greater Yellowlegs (*Totanus melanoleucus*), White-crowned Sparrow (*Zonotrichia l. leucophrys*), two Lincoln's Sparrows (*Melospiza l. lincolni*) and a Cape May Warbler (*Dendroica tigrina*). Mr. Rogers said that he and Mr. W. DeW. Miller had put in seventeen hours in the Watchung Mountains and Passaic Valley north of Plainfield and had noted 89* fully identified species as against 104 on little more than the same route last year. Oddly enough, their list of *Mniotiltidæ* consisted of the same 24 species each year. Among their less usual birds this year were a flock of seven Least Sandpipers (*Pisobia minutilla*), three Lincoln's Sparrows, a singing male Tennessee Warbler (*Vermivora peregrina*) and seven Cape May Warblers, some in song.

Mr. Howard H. Cleaves gave a talk on "Emotion in Birds as a Means to Photography," in which he illustrated with many lantern-slides the ways in which birds' love of offspring, curiosity, hunger, etc., could be taken advantage of by the clever photographer.

Mr. Charles H. Rogers showed a series of lantern-slides of Costa Rican birds, from drawings by Fuertes and others, from mounted specimens and from life, and gave notes on their habits and other points observed by him on a trip made in 1912.

October 1?, 1915.—The President in the chair. Eight members (Dr. Dwight and Messrs. Chapin, Fleischer, Harper, Hix, Hollister, Marks and Rogers) and a visitor present.

Mr. Fleischer mentioned seeing an adult European Goldfinch

* See "Plainfield, New Jersey, Bird Census," Wilson Bulletin, 1915, 403–407.

(*Carduelis carduelis*) in Prospect Park, Brooklyn, May 27, but perhaps rather a recently escaped cage-bird than a descendant of the former colony.

Mr. Rogers said he had found a singing Alder Flycatcher (*Empidonax trailli alnorum*) in a typical locality for the species in Van Cortland Park May 30, indicating, probably, a breeding pair. He also told of an Acadian Flycatcher (*E. virescens*) near Crosswicks, N. J., so tame that at his first visit she returned to her nest and settled on her eggs while his face was within a foot.

Mr. Hollister reported both Common (*Sterna hirundo*) and Roseate (*S. dougalli*) Terns present at Easthampton, L. I., all summer, though he knew of no nesting ground in the vicinity.

Several observers spoke of birds as being unusually plentiful this autumn. Sapsuckers (*Sphyrapicus v. varius*) and Red-breasted Nuthatches (*Sitta canadensis*) have both been common. Mr. J. M. Johnson, Mr. Nichols and Mr. Rogers had listed 63 species about Englewood October 10, including three Tennessee Warblers (*Vermivora peregrina*). Mr. Hix and two friends had seen 52 species about Millington, N. J., the day of the meeting, including a Tennessee Warbler, an adult male Cape May Warbler (*Dendroica tigrina*) and three Turkey Vultures (*Cathartes aura septentrionalis*). Mr. Fleischer and Mr. Johnson had noted 40 species, including a Yellow-billed Cuckoo (*Coccyzus a. americanus*), in Prospect Park that morning. On the other hand, Mr. Fleischer and others had found the smaller shorebirds much less than usually common on the south shore of Long Island.

Mr. Harper recorded a male Golden Plover (*Charadrius d. dominicus*) collected October 3 on Jamaica Bay by Mr. Rockwell of the Brooklyn Museum.

October 26, 1915.—The President in the chair. Seventeen members (Dr. Dwight and Messrs. Cleaves, Fleischer, Harper, Heller, Hix, Hollister, F. W. Hyde, J. M. Johnson, Kieran, LaDow, Marks, Murphy, Nichols, Rogers, Weber and Woodruff) and 28 visitors present.

The more interesting of the local records reported follow:

a Turkey Vulture (*Cathartes aura septentrionalis*) in Orange County, N. Y., October 23 (Johnson), a pair of Piping Plover (*Ægialitis meloda*) at Long Beach, L. I., October 17 (Fleischer), Meadowlarks (*Sturnella m. magna*) in Central Park October 23–25 (Hix).

Mr. Nichols exhibited a living Tiger Salamander (*Amby-stoma*), an unusually fine specimen, recently sent him from Patchogue, L. I., by Dr. Frank Overton.

The first speaker of the evening was Mr. J. M. Johnson, whose title was, "Some Colorado Birds." The speaker had spent much of the previous summer in Estes Park and now told of many of the birds most interesting to an Easterner, telling what he had noted of their appearance in comparison with their eastern relatives, their habits, calls and songs. The talk was illustrated with skins of most of the birds described and with photographs of the country and of some of the smaller mammals and birds, the latter including two Rocky Mountain Jays (*Perisoreus canadensis capitalis*) tugging at food in Mrs. Johnson's fingers and perching on her lap.

The Secretary then spoke a few words on the difficulty of getting members to fill the program on nights when no long paper was provided. The Society has, he said, an excellent system giving an opportunity for papers of any length and nature. At the open meetings, the first in each month, any member has a chance to take from five to thirty minutes or more to share with the others any experience he has had or the results of any bit of work he has done, or to propose any subject for general discussion. It would be a pity were there not in and about New York enough people interested in ornithology and other branches of natural history thus to fill one evening a month to the interest and benefit of all. Members are urged to volunteer for such talks to save themselves the annoyance of being solicited personally or by postal card.

The second paper was presented by Mr. R. C. Murphy and was entitled, "Notes on a Trip into the Lower California Desert." This trip was made in the spring of this year chiefly to procure Pronghorns (*Antilocapra americana*) and accessories for a group for the Brooklyn Museum. Mr. Murphy told of

the interesting ways of the numerous Pronghorns observed and gave notes on many of the 75 species of birds and the various other forms of life met with, from caterpillars to Villista cavalrymen. He also dwelt on the novel features of camping in a country where the noonday temperature in the shade exceeded 120° F. and the only water-hole within miles was a watering place for myriads of caterpillars. The speaker hoped it would soon be possible for some government to give protection to the fast-disappearing game of Lower California, a land now given over to the market hunter. Bird skins and photographs of the country and of the expedition illustrated the paper.

November 9, 1916.—The President in the chair. Eleven members (Dr. Dwight and Messrs. Ball, Chapin, Cleaves, Harper, Hix, F. W. Hyde, Marks, Nichols, Quarles and Weber) and three visitors present. In the absence of the Secretary, the Chair appointed Mr. Nichols Secretary *pro tem.*

Mr. Hix told of a trip with Mr. Fleischer, Mr. Rogers and others to Long Beach, L. I., November 2, on which remarkably close and satisfactory studies had been enjoyed of a Clapper Rail (*Rallus c. crepitans*), a Purple Sandpiper (*Arquatella m. maritima*) and a Lapland Longspur (*Calcarius l. lapponicus*); 16 Sanderling (*Calidris leucophæa*) were also noted. On the 8th Mr. Hix had seen 23 Bluebirds (*Sialia s. sialis*) in Central Park.

Mr. Quarles reported that Canvasbacks (*Marila vallisneria*) had recently for the first time been successfully bred in captivity.

Mr. Harper submitted the following notes:

"The Mourning Warbler (*Oporornis philadelphia*) is apparently of very rare occurrence on Long Island. . . . It was recorded about 1840 (Giraud) and again in June, 1862 (Howell). Latham has found it twice at Orient (September 18, 1906, and September 26, 1908). Mrs. E. W. Vietor permits me to record one seen in Prospect Park on May 14, 1912. A sixth specimen was seen by myself at Shoreham on May 30, 1915.

"I saw a Bobolink (*Dolichonyx oryzivorus*) on November 2 in the meadows between Flushing and College Point, L. I. This is apparently the latest New York State record.

"I saw a Yellow Palm Warbler (*Dendroica palmarum hypochrysea*) on November 6 in the meadows between Flushing and College Point, L. I. This is apparently the latest Long Island record.

"On November 6 I saw about 10,000 Starlings (*Sturnus vulgaris*) settle for the night in the beds of reeds (*Phragmites*) in the meadows between College Point and Flushing, L. I. Five or six years ago an almost equal number were observed roosting there at about the same time of year. On each occasion some Grackles (*Quiscalus quiscula*) associated with the Starlings."

Mr. Cleaves outlined the past work of the American Bird-Banding Association, which has grown considerably. Mr. Murphy has used its bands in the Southern Hemisphere, two Arctic expeditions now in the field are equipped with bands for such birds as migrate southward, and the work has begun to be taken up in the Pacific States. The speaker showed a small exhibit of the bird-banding work which he had prepared for the Brookline Bird Club, and called attention to interesting return records of Common Tern (*Sterna hirundo*), Night Heron (*Nycticorax nycticorax nævius*), Osprey (*Pandion haliaëtus carolinensis*), Chimney Swift (*Chætura pelagica*), Robin (*Planesticus m. migratorius*), etc.

Mr. Chapin spoke of the peculiar migration* of the Pennant-winged Nightjar (*Cosmetornis vexillarius*) across the African Equatorial Forest belt twice a year, and called attention to other migration routes of African birds.

Lack of time necessitated the postponement of brief papers prepared by Mr. Harper and by Mr. Weber.

November 23, 1915.—The President in the chair. Fifteen members (Dr. Dwight and Messrs. Bowdish, Chapin, Cleaves, Davis, Granger, Harper, Heller, Hix, Lang, Lemmon, Marks, Nichols, Rogers and Weber) and thirteen visitors present.

The Secretary announced the arrival from the printers of the Society's *Abstract of Proceedings* Nos. 26 and 27, covering the two years ending March 9, 1915, and bound under one cover. Owing to a misunderstanding the printers had sent it without waiting for the index, which was to be printed and sent to us for insertion before the copies were distributed by mail. Members present, however, might take their copies at the close of the meeting.

The first paper of the evening was, "Observations on the

* See "The Pennant-winged Nightjar and its Migration," *Bull. Am. Mus. Nat. Hist.*, XXXV, 73–81.

Wood Buffalo of the Northwest," by Mr. Francis Harper, who had assisted in a Canadian Government expedition into that region in the summer of 1914. The Wood Buffalo is a subspecies (*Bison bison athabascæ*) of the American Bison, and now exists in two carefully protected and prospering herds, aggregating perhaps 500 individuals, in the country between Great Slave and Athabasca Lakes. This country is made up of forest, bushy areas and muskegs, the Bison inhabiting all three. Mr. Harper had succeeded in seeing only one of the animals, but he related what he had been able to glean of their habits from the numerous signs,—trails, wallows, etc.,—and from officials and other residents, illustrating his observations with photographs, which were passed around.

Mr. James P. Chapin then gave the results of his last summer's trip into Alberta, under the title of, "Natural History Impressions from the Canadian Rockies." The appearance and behavior of such Rocky Mountain species as the Pika or Rock Rabbit (*Ochotona princeps*), the Marmot or Whistler (*Marmota flaviventer*), the Yellow-haired Porcupine (*Erethizon epixanthum*), the Spruce Grouse (*Canachites canadensis**) and the American Dipper (*Cinclus mexicanus unicolor*) were touched on and lantern-slides of many of them and of the grand mountain scenery were shown. Discussion followed.

December 13, 1915.—The President in the chair. Thirteen members (Dr. Dwight, Dr. F. M. Chapman, and Messrs. Ball, Chapin, Chubb, Cleaves, Granger, Harper, J. M. Johnson, Lang, Murphy, Nichols and Rogers) and 26 members of the Section of Biology of the New York Academy of Sciences (with which the meeting was held jointly) and visitors present.

Dr. Frank M. Chapman was the first speaker of the evening and read his paper† on, "The Origin of Zonal Faunas in the Andes." He explained a series of lantern-slides showing the physical nature and vegetation of the several zones in the three-ranked Andes of Colombia, from sea-level to perpetual snow and from the Pacific to the llanos of the east. He then ex-

* See female collected, Am. Mus. Nat. Hist., No. 132654.

† See "The Distribution of Bird-Life in Colombia; a Contribution to a Biological Survey of South America," *Bull. Am. Mus. Nat. Hist.*, XXXVI.

hibited maps depicting the extent of these zones, and described how the highland fauna had been left as it were on islands by a retreating tide of northern forms and how the life of the Pacific coast had been since acquired from the north, and that of the interior valleys from the south around the northeastern end of the ranges.

Mr. C. William Beebe gave the second paper, entitled, "A Tetrapteryx Stage in the Evolution of Birds."* He had discovered a double row of feathers, apparently analogous to wing-quills and their coverts, across the membrane of the hind limb of a squab White-winged Dove (*Melopelia asiatica*). This led to the conception of his theory that far back in the great gap between Archæopteryx and its reptilian ancestors, the pro-aves had begun gliding flight from an eminence by means of the imperfect development of all four limbs as wings. Similar feathers in the very young of some other birds, particularly Jacanas (*Jacana*), and the fact that in bats and in all living creatures with gliding flight the hind limbs function, strengthened the theory. Considerable discussion, led by Dr. Gregory, followed.

Dr. Mathews read extracts from Prof. Thomas Barbour's review of his "Climate and Evolution."

December 28, 1915.—The President in the chair. Thirteen members (Dr. Dwight and Messrs. C. G. Abbott, Chapin, Cleaves, Harper, Hix, F. W. Hyde, Ladd, Lang, Marks, Rogers, Saunders and Weber) and 8 visitors present.

Mr. Rogers proposed for Resident Membership Mr. Clarence R. Halter, a Columbia University student working also in the Department of Herpetology of the American Museum. The name was referred to the Committee on Membership.

Mr. Rogers exhibited various recent accessions to the Museum's collection of local birds, the more interesting being:

Ruff (*Machetes pugnax*), a male in immature plumage, taken September 27, 1914, at Freeport, L. I.

American Egret (*Herodias egretta*), a male just completing its post-nuptial molt, picked up at Ossining, N. Y., July 31, 1915.

* See this title in *Zoologica*, II, 35–52.

American Goshawk (*Astur a. atricapillus*), an adult and an immature bird, two of four received in the flesh this autumn, as follows:

Adult male, November 1, Morris, Otsego County, N. Y.

Adult male, November 11, near Smithville Flats, Chenango County, N. Y.

Adult, October 21, Norfolk, Conn.

Immature male, December 5, Stag Lake, Sussex County, N. J.

Barn Owl (*Aluco pratincola*), a young bird with down still clinging to some feathers, taken from the nest on top of a water tank (sheltered by a roof) at Jamaica, L. I., December 1, 1915.

Mr. Rogers mentioned that the returns so far received for "Bird-Lore's" Christmas Census indicated the absence of Pine Siskins (*Spinus pinus*) and the other irregular winter visitors, and the presence of Black-capped Chickadees (*Penthestes a. atricapillus*), so scarce last season, in even greater numbers than usual.

Mr. Weber opened the announced discussion on profitable club activities. What had for years interested him especially, he said, was the question *why* the Chickadee was so abundant some seasons and so scarce in others, and in general what caused the fluctuations in the numbers of birds, marked in some species, doubtless present in most. He suggested that a systematic and accurate series of censuses in definite localities would in time yield data covering the facts of fluctuation and that these in connection with data on the weather, food supply and other possible influences would probably bear interesting results. Mr. Weber considered that the Linnæan Society was in a good position to undertake such work.

Mr. Ladd spoke of the rapidly increasing number of large local bird clubs throughout the country, most of whose members know next to nothing about birds and are constantly demanding information on questions of identification, feeding, nesting, etc. Furthermore, very many of these people are installing feeding places and nest boxes and are acquiring information concerning nesting habits, incubation, care of the

young, etc., nearly all of which is soon lost. Mr. Ladd's suggestion was that this Society should act as a clearing house for all these observers, receiving and utilizing information from those who would supply it and giving it to those who asked.

After much discussion it was voted that the President appoint a committee who should consider ways and means by which the ideas of Mr. Weber and of Mr. Ladd might be acted upon.

January 11, 1916.—The President in the chair. Eleven members (Dr. Dwight and Messrs. Cleaves, Fleischer, Harper, Hix, Lemmon, Marks, Nichols, Philipp, Rogers and Weber) and three visitors present.

Mr. Clarence R. Halter, whose name had been proposed at the previous meeting, was elected to Resident Membership.

Mr. Rogers reported that in the Englewood Region January 9, he and Mr. J. M. Johnson had seen a flock of three Savannah Sparrows (*Passerculus sandwichensis savanna*), the first January record for the Region, the latest previous being December 19.

Several members who had visited the Jerome Reservoir reported no ducks other than American Mergansers (*Merganser americanus*). Mr. Rogers said that Mr. Kieran, who lives nearby, thought the shooting done to scare away the gulls accounted for this at least in part.

Mr. Nichols spoke of Tufted Tits (*Bæolophus bicolor*) and Chickadees (*Penthestes a. atricapillus*) as being more than usually common about Englewood this winter. He had seen as many as eight to ten of the former in one flock and thirty to forty of the latter in another. Several Red-breasted Nuthatches (*Sitta canadensis*) are wintering in the Region.

A visitor, Mr. H. K. Decker, recorded a pair of Evening Grosbeaks (*Hesperiphona v. vespertina*) seen by himself and a friend, Mr. Hermann, January 9 and 10 near West New Brighton, Staten Island. They were in a growth of scrubby oaks, apparently feeding on the buds, and allowed themselves to be watched at a range of six to eight feet. Mr. Decker said that he had noticed particularly the great yellow bills, and that the male had seemed to him brighter and yellower than the pictures by Fuertes and others had led him to expect.

Mr. Rogers read extracts from reports on bird censuses and how to take them, notably "A Sectional Bird Census"* by Frank L. Burns and the recent work in that line by the United States Department of Agriculture, and suggested a scheme of his own for a week's census of breeding birds.

The President appointed the following a committee to consider the ideas for club activities brought forward at the previous meeting: Messrs. Weber, Cleaves, Harper, Nichols and Rogers.

Mr. Philipp told of a trip made by himself and Mr. B. S. Bowdish to northern New Brunswick the previous summer. They had made a special study of the nesting of the Tennessee,† Yellow Palm and Bay-breasted Warblers (*Vermivora peregrina*, *Dendroica palmarum hypochrysea* and *D. castanea*), all of which they had found breeding commonly. The Tennessees and Yellow Palms nested for the most part rather gregariously on dry ground under branches of scrub spruce. The Yellow Palm's complement of eggs to a set was four or five, the Tennessee's five or six or even seven, the Bay-breast's six or seven.

January 25, 1916.—The President in the chair. Sixteen members (Dr. Dwight and Messrs. Ball, Chapin, Cleaves, Granger, Harper, Hix, F. W. Hyde, J. M. Johnson, Kieran, Lemmon, Marks, Nichols, Rogers, Weber and Woodruff) and twenty-two visitors present.

It was voted that the President appoint a committee to draw up resolutions to express the Society's sense of loss in the death of Dr. Daniel Giraud Elliot.

Mr. Hix recorded two Horned Grebes (*Colymbus auritus*) in Pelham Bay Park January 6, and that several persons whom he knew had told him of a Phœbe (*Sayornis phœbe*) that had been wintering in Bronx Park.

Mr. Johnson reported an immature Glaucous Gull (*Larus hyperboreus*), two Sanderling (*Calidris leucophœa;* uninjured), at least one—probably several—Sharp-tailed Sparrows (*Pas-*

* See this title in Wilson Bulletin, 1901, 84–103; also "Second Sectional Bird Census, 1914," *Bird-Lore*, XVII, 109–111.

† See "The Tennessee Warbler in New Brunswick," *Auk*, XXXIII, 1–8.

serherbulus caudacutus) and a Swamp Sparrow (*Melospiza georgiana*) seen by himself, Mr. LaDow and Mr. Rogers at Long Beach January 16.

Mr. Nichols said that he had seen on January 19 from the 23d Street Ferry, an adult Iceland Gull (*Larus leucopterus*). He had noted the smaller size, paler mantle and less heavily built head and bill as compared with the adult Herring Gulls (*L. argentatus*) present; the pearl-gray of the wings faded gradually into white toward the edge and tip, and there was no black.

Dr. G. Clyde Fisher remarked that he had seen Goldeneyes (*Clangula clangula americana*) as well as Mergansers (*Merganser americanus*) on the Jerome Reservoir January 23.

Mr. George K. Cherrie gave the paper of the evening, entitled, "Nesting Habits of Some South American Birds." From his many years' experience he gave some of the most interesting cases observed, illustrating many of them with lantern-slides. There was considerable discussion of the paper and Mr. Chapin told of a number of close parallels in the case of certain Congo birds, of quite unrelated species, to those just described by Mr. Cherrie.

February 8, 1916.—The President in the chair. Eight members (Dr. Dwight, Cleaves, Fleischer, Harper, Hix, Marks, Nichols and Rogers) and a visitor present.

It was voted unanimously that on the occasion of the coming Annual Dinner the Society's medal be presented to Dr. J. A. Allen in recognition of the value of his contributions to the sciences of mammalogy and ornithology. The Chair appointed Mr. Woodruff and Mr. Rogers a committee to make all arrangements necessary for the Dinner.

It was decided to publish as soon as possible after the Annual Meeting an "Abstract" to contain the minutes of the meetings of the year ending March 14, the report of the bird-banding work and any other acceptable material received in time.

Mr. Nichols gave a brief paper on "The Song Season of 1915." From careful observations made during this one season, he divided tentatively our common singing birds into four groups,

as follows: Group A, typified by the Barn Swallow (*Hirundo erythrogastra*), those species that stop short their singing about early June, at the time their young leave the nest, and have no second song-season; Group B, typified by the Black and White Warbler (*Mniotilta varia*), whose singing lasts till mid-August, though petering out gradually before that time; Group C, typified by the Wood Pewee (*Contopus virens*), those species that cease singing early but have an early second season; Group D, typified by the Fox Sparrow (*Passerella iliaca*), with a late second season, even after performing part of their migration. Considerable discussion followed.

February 22, 1916.—The President in the chair. Twelve members (Dr. Dwight and Messrs. Chapin, Cleaves, Halter, Hix, LaDow, Lang, Marks, Murphy, Nichols, Rogers and Streeter) and forty-nine visitors present.

The Society passed unanimously the following resolutions:

Resolved, that in the death of Daniel Giraud Elliot, an Honorary Member of this Society, science has lost an enthusiastic and distinguished promoter, whose labors have had an important influence upon the advancement of our knowledge of zoölogy; whose many valuable contributions to that subject have been an incentive and an aid to countless fellow-workers; and whose geniality and uprightness, no less than his scientific accomplishments, brought him the highest esteem of his associates.

Resolved, that these resolutions be incorporated in the minutes of the Society, and that a copy be transmitted to Doctor Elliot's family.

Mr. Hix reported seeing two Bald Eagles (*Haliaëtus l. leucocephalus*) along the Palisades in the Englewood Region February 5, and four more on the 12th, one of them being tormented by Crows. He also saw two Duck Hawks (*Falco peregrinus anatum*); the male at first was carrying a pigeon, but the female seized it from him in the air, and the male chased her out of sight.

Mr. Rogers recorded a male Belted Kingfisher (*Ceryle alcyon*) from Troy Brook, about three miles south of Boonton, N. J., February 20.

Dr. William K. Gregory presented the paper* of the evening, on "The Evolution of Land-Living Animals from Fishes."

* See "The Present Status of the Problem of the Origin of the Tetrapoda," *Annals N. Y. Acad. Sci.*, XXVI, 317–383.

Dr. Gregory pointed out the resemblances between the fishes and other vertebrates, and also the differences, chief among the latter being that between fins and limbs, and traced the development of the fin from a simple fold of skin to the flexible paddle attained by a few forms. One of the greatest gaps in evolutionary history is that between even the most advanced fish paddle and even the most generalized limb. The speaker discussed the claims of the various sub-classes of fishes to be considered as the ancestors of the terrestrial animals. The two possibilities are the Dipnoans, which have modern representatives in the lung-fishes of Africa, Australia and South America, and the Crossopterygian fishes of the Devonian period, represented today only by *Polypterus* and *Callamoicthys* of Africa. The evidence is strongly in favor of the Crossopterygians. The paper was fully illustrated with lantern-slides, and specimens of fossil fishes were on exhibition after adjournment.

March 14, 1916.—Annual Dinner, held at the Hotel Evelyn, the President presiding, and attended by twenty-five members (including Messrs. Halter, LaDow, Kieran and duVivier who did not attend the Annual Meeting), seven guests of the Society (Mrs. J. A. Allen, Dr. and Mrs. Frederic A. Lucas, Mr. H. E. Anthony and Miss Demerell, Mr. W. DeW. Miller, and Mr. R. C. Andrews), and thirteen guests of individual members, besides Dr. J. A. Allen, a Resident Member and the Society's guest of honor, to whom was presented the Society's medal, in recognition of the value of his contributions to the sciences of mammalogy and ornithology.

Dr. Allen replied in part as follows:

Mr. President, and Members of the Linnæan Society of New York:

I thank you heartily for this evidence of your kindness and of your appreciation.

Thirty-one years ago I entered upon my duties as a curator in the American Museum of Natural History. A cordial welcome was officially extended to me by this Society a few weeks after my arrival in New York, by a dinner at the Murray Hill Hotel on the evening of May 5, 1885. Mr. E. P. Bicknell was then President. A long address was made by Dr. C. Hart Merriam, lauding my achievements as a naturalist and explorer. This was followed by other speeches of less length but of equal cordiality

by Mr. L. S. Foster, then Secretary of the Society, and by Mr. George B. Sennett, Dr. George Bird Grinnell and Dr. O. W. Willis.

Naturally I began at once to take an active interest in the work of the Linnæan Society, and found its bi-monthly meetings at the rooms of the New York Geographical Society, at 11 West 29th Street, oases of pleasure in the routine of my duties at the Museum. Four years later, in 1889, I was promoted to the Presidency of the Society, which office I held for nine years, but I fear I filled it very inadequately. The Museum then soon became the headquarters of the Society, and for a considerable number of years its meetings were held in the Museum Library.

During the long period of my connection with this Society its membership has, naturally, greatly changed. The younger men who now support its activities belong to a later generation. Of those who founded it and were its early supporters, a few have passed over the great river, while most of the others have attained eminence in their special fields of endeavor and occupy high positions in the scientific service of their country. I need mention the names of only a few to assure you of the truthfulness of this statement: Bicknell, now a distinguished botanist and an officer of the New York Botanical Garden; Dutcher, who aroused public interest in our wild bird life and founded the National Association of Audubon Societies and became its President; Fisher, of the United States Biological Survey; Mearns, long a distinguished officer of the medical department of the United States Army, and an enthusiastic and able explorer of not only our own formerly "Wild West," but of the Dark Continent and the Philippines, and now an Honorary Assistant in our National Museum; Merriam, the organizer and for many years the Chief of our great Biological Survey; and others who also are entitled to honorable mention. Of members now active in the Society I shall mention only two, Walter Granger, who for many years served as its faithful Secretary, and Dr. Dwight, who has long borne its burdens as President. These men we have long had with us, and you well know their excellencies and attainments.

Mr. President and Members of the Linnæan Society: Again I thank you heartily for this beautiful testimonial of your respect and appreciation.

At the close of Dr. Allen's address, the Society adjourned to the usual meeting place in the American Museum of Natural History for the Annual Meeting.

Annual Meeting.—The President in the chair. Twenty-two members (Dr. Allen, Dr. Dwight and Messrs. Abbott, Ball, Bishop, Chapin, Cleaves, Davis, Harper, Hix, F. W. Hyde, F. E. Johnson, J. M. Johnson, Lang, Lemmon, Marks, Murphy, Overton, Riker, Rogers, Weber and Woodruff) and eighteen visitors present.

The Treasurer read his annual report, showing a balance of

$2,208.02. The President appointed Mr. Granger and Mr. Nichols a committee to audit this report.

The Secretary then read his report, as follows:

During the past year the Linnæan Society has met its full quota of sixteen times, with a total attendance of 428 persons. The Third Annual Dinner, a simple one with no speakers, was attended by 20 members and 5 guests, and there were 20 members and a visitor at the Annual Meeting following it the same evening. At the remaining fifteen meetings the attendance averaged 27, the largest in three years, while the average of members (12.5) was 25 per cent. greater than that of either of the two previous years. The largest number present at any one meeting was 61, on February 22; the smallest was 9. The first December meeting was held jointly with that of the Section of Biology of the New York Academy of Sciences, by invitation of the latter.

The Society has during the past year lost by death one Honorary Member, Dr. Daniel Giraud Elliot; one Corresponding Member, Mr. Charles F. Holder, of Pasadena, California; and three Resident Members, Mr. Samuel Thorne, the Hon. D. O. Wickham, of Cleveland, Ohio (died in December, 1914), and Mr. Thomas H. Hubbard. Four Resident Members have been elected, nine have resigned and three have been dropped automatically for arrears in dues. The membership list now stands: Resident, 96; Corresponding, 26; Honorary, 2; total, 124.

Twelve papers of some length have been presented before the Society, two on evolution (one of them of birds alone), four others on birds, two on mammals, one anthropological and three on zoölogical expeditions. In addition there have been several brief papers, chiefly ornithological. The papers have been illustrated with lantern-slides, living and museum specimens, etc.

Under date of November 23, 1915, the Society published under one cover its *Abstract* Nos. 26 and 27, 56 pages, containing the minutes for the two years ending March 9, 1915.

It is hoped to publish this spring an *Abstract* to contain at least the minutes of the past year and the report of the American Bird-Banding Association.

Dr. J. A. Allen was proposed by Mr. Rogers for Honorary Membership, and unanimously elected, with applause.

The following officers were elected to serve for the ensuing year:

PRESIDENT, Jonathan Dwight.
VICE-PRESIDENT, Julius M. Johnson.
TREASURER, Lewis B. Woodruff.
SECRETARY, Charles H. Rogers.

Mr. Chapin showed a selected series of lantern-slides from his Congo photographs, a few of the best of each of the several subjects, anthropology, fishes, batrachians, reptiles, birds and mammals, describing in his talk the most interesting features of their habits, etc.

ABSTRACT

OF THE PROCEEDINGS OF THE

LINNÆAN SOCIETY

OF

NEW YORK,

FOR THE YEAR ENDING MARCH 13, 1917.

This is the twenty-ninth in the series of *Abstracts* published by the Linnæan Society of New York, and, like the preceding issues, is prepared mainly as a brief review of the work of the Society during the year closing with the date indicated above. Papers presented before the Society and published elsewhere (often enlarged or otherwise different in form) are mentioned with proper reference to the place of publication.

March 28, 1916.—The President in the chair. Fifteen members (Dr. Dwight and Messrs. Ball, Chapin, Cleaves, Davis, Granger, Hix, Hollister, J. M. Johnson, LaDow, Lang, Marks, Rogers, Weber and Woodruff) and twenty visitors present.

The President appointed the previous year's committees to serve without change during the ensuing year.

A discussion of the migration by members active in the field showed that hardly any migrants arrived before March 25, but that on that day, the very first warm one following eight weeks of almost daily snowfall, with the ground still deeply covered, the country about the City was flooded with all the commoner March migrants. Mr. Weber stated that a hundred or two hundred Black Ducks (*Anas rubripes*) appeared on Overpeck Creek that day, although the ice had gone out but

the day before, and Mr. Hix had noted a Red-breasted Nuthatch (*Sitta canadensis*) and a Hermit Thrush (*Hylocichla guttata pallasi*) in Central Park.

Mr. Herbert Lang gave the Society a lecture, illustrated with lantern-slides and specimens, on "The Okapi and its Life-History." The speaker's six years in the Belgian Congo, the northern part of which is the Okapi's entire range, had given him a knowledge of the species probably fuller than that possessed by any other white man, so that besides giving a history of it as a known species and discussing its systematic position, he was able to tell many of the facts of its life-history. The Okapi (*Okapia johnstoni*), he said, was not an inhabitant of almost impenetrable swampy jungle, as was generally believed, but lived in high, rather open forest, only visiting briefly or passing through the lower country. It seems to feed entirely on the leaves of shrubbery, of which Mr. Lang found fourteen species that it had been eating. It is found usually singly, never in herds. Mr. Lang has never seen a living Okapi in nature and, in spite of stories to the contrary, some of which he knows to be false, believes that no white man has; there is always a carpet of dead leaves in its favorite haunts and the animal's very large ears have exceedingly keen hearing. All that are procured are trapped by the natives, who get several hundred a year, but Mr. Lang considers the species to be holding its own. He saw in all thirty-two specimens, and the expedition brought to the American Museum a very representative series.

April 11, 1916.—The President in the chair. Twelve members (Dr. Dwight and Messrs. Chapin, Davis, Granger, Griscom, Hix, Hollister, Marks, Murphy, J. T. Nichols, Rogers and Weber) and three visitors present.

At the request of Mr. Murphy, the regular order of business was waived that he might present at once his paper* on "New Facts as to the Relationships of the South Georgia Teal." The speaker's conclusions were that the species, the southernmost duck in the world, was a true *Nettion* (*N. georgicum*) and that its near relative generally known as *Dafila spinicauda*, of South

* See "Anatidæ of South Georgia," *Auk*, XXXIII, 270–277.

America, would have to be put in the same genus unless a new one were made for it. Mr. Murphy also described nesting and other habits of the South Georgia Teal as noted by him on his expedition of 1912. After discussion Mr. Murphy had to leave to keep another engagement.

Mr. Nichols recorded for Mr. Murphy a Dovekie (*Alle alle*), recently received at the Brooklyn Museum, which had been picked up, not long dead, on the beach at Montauk Point, L. I., April 3, a late record.

Mr. Davis recalled the Duck Hawk (*Falco peregrinus anatum*) that had dwelt for so long in the winter a year ago about the Municipal Building, Manhattan, and said that on March 21 he had found near the summit of that building's tower remains of recently-killed pigeons, indicating that the same bird or one of the same species had again been frequenting the place.

Mr. Nichols told of a Duck Hawk he had seen April 5 at Garden City, L. I. It had just killed a bird of about the appearance of a Meadowlark (*Sturnella*), which it grasped firmly and tucked up under its tail, and then, rising steadily, it flew away northeastward as though migrating and taking its prey along to eat when hungry.

Reports showed a migration of Holbœll's Grebe (*Colymbus holbœlli*) early in the month, the following having been noted:

April 1, Passaic River east of Boonton, N. J., 1—R. C. Murphy.
2, Overpeck Creek, N. J., 2—J. M. Johnson and C. H. Rogers.
7, Overpeck Creek, N. J., 1 (collected)—J. A. Weber.
6–11, south half of old reservoir, Central Park, 1—G. E. Hix, etc.

Mr. Hix reported Yellow Palm Warbler (*Dendroica palmarum hypochrysea*) and Louisiana Waterthrush (*Seiurus motacilla*) in Central Park on April 2; he had seen the latter take a little fish from the water and eat it, but did not know whether the fish had been alive or dead when seized.*

Mr. Weber reported for the Census Blank Committee that

*See "Louisiana Waterthrush Eating Fish," *Copeia*, April, 1916, 31.

a list of ten permanently resident species of birds had been decided on and that blanks would be printed covering these.

Mr. Rogers exhibited a Gyrfalcon (*Hierofalco*) recently taken on Fisher's Island, L. I., and discussed the status of the several forms of gyrfalcons, of which he showed specimens. Without having enough time or material to make a decision possible, the speaker considered it probable that at least in North America there was but one subspecies, varying individually from white to fuscous, different phases predominating in different portions of its range. The Long Island specimen was referable to *obsoletus* as at present recognized.

April 25, 1916.—The President in the chair. Fourteen members (Dr. Dwight, Dr. F. M. Chapman and Messrs. Ball, Chapin, Cleaves, Granger, Halter, Hix, Hollister, F. E. Johnson, Lang, Marks, Rogers and Weber) and thirty-three visitors present.

Mr. Rogers recorded an early Parula Warbler (*Compsothlypis americana usneæ*), a singing male, well seen, along the Rahway River above Millburn, N. J., April 23.

Mr. Ernest Thompson Seton gave the evening's lecture, on "Woodcraft in New York City." The speaker took up especially things in the nature of blazes, totems or symbols, sign-language and even customs that are found today in New York and other cities and yet may be traced back to our early civilization,—some, indeed, to the woodcraft—which was then the knowledge of how to exist—of primitive man. Mr. Seton had for several years been making a special study of sign-language and had found no fewer than 150 signs in use among school children, though many of them would answer by a shake of the head the question as to whether they ever used sign-language. He also showed how many of these things were being revived, adapted and made a part of modern industrial life. Blackboard sketches illustrated the talk.

May 9, 1916.—The President in the chair. Ten members (Dr. Dwight and Messrs. Cleaves, Fleischer, Granger, Hix, Hollister, J. M. Johnson, Marks, J. T. Nichols and Rogers) and twenty-one visitors present.

The following were the more interesting records reported:

by Mr. Johnson, a male Black-poll Warbler (*Dendroica striata*) at Nordhoff, N. J., April 30—probably the earliest date for the region about New York City; by Mr. Hix, from Central Park: American Crow (*Corvus b. brachyrhynchus*), less uncommon than usual; Fish Crow (*C. ossifragus*), one on April 29 (three May 4 by Mr. Rogers); Prothonotary Warbler (*Protonotaria citrea*), a male April 30; Tennessee (*Vermivora peregrina*), Palm (*Dendroica p. palmarum*) and Hooded (*Wilsonia citrina*) Warblers May 4; a Brewster's Warbler (*V. leucobronchialis*) May 5; and an Osprey (*Pandion haliaëtus carolinensis*) on the 9th; by Mr. Fleischer, a male Red-winged Blackbird (*Agelaius p. phœniceus*) in Central Park May 6 and seven in Prospect Park on the 7th where on that day between 5 and 9:30 A.M. he noted 57 species of birds, 19 of them *Mniotiltidæ*, including one Brewster's Warbler.

Mr. Nichols read a paper discussing Alex Wetmore's "Birds of Porto Rico," adding thereto notes of his own on birds noted by him on the Island at a time of year not covered by Mr. Wetmore. He also discussed the status of the West Indian species of *Æstrelata*. His remarks* were illustrated with specimens.

Mr. Rogers gave an account of the birds to which reference is made in Shakespeare's plays, and on the adjournment of the meeting, showed the members the Museum's exhibit of practically all the species mentioned, some forty in all.

May 23, 1916.—The Vice-President in the chair. Eleven members (Messrs. Cleaves, Fleischer, Granger, Hix, Hollister, J. M. Johnson, Lang, Marks, J. T. Nichols, Rogers and Weber) and twenty visitors present.

From Long Beach, L. I., May 21, Mr. Fleischer recorded a Red-backed Sandpiper (*Pelidna alpina sakhalina*), and, with Mr. Hix and Mr. Rogers, two Least Terns (*Sterna antillarum*) and a Western Grebe (*Æchmophorus occidentalis*). Although Long Island is at such a great distance from the range of the Grebe, the circumstances—length, distance, light, etc.—of the observation were so entirely favorable as to leave the observers confident in their identification.

* See "Two New Species of Petrels from the Bermudas," *Auk*, XXXIII, 194–195; also, "Limicolæ at Porto Rico in July," *l. c.*, 320–321.

Mr. Weber reported collecting a male Summer Tanager (*Piranga r. rubra*) at Fort Lee, N. J., May 5.

Mr. Johnson stated that on May 21 he had found a Lawrence's Warbler (*Vermivora lawrencei*) near Englewood, N. J.; it was singing the song of the Blue-wing (*V. pinus*) and finally disappeared chasing a singing bird of that species. Mr. Johnson had recently caught a Greater Yellowlegs (*Totanus melanoleucus*) in Prospect Park; its first and second primaries were broken, but it flew some three hundred yards when released.

Mr. Rogers described* his annual try with Mr. W. DeW. Miller for a big day. On May 14, over most of their usual route northward from Plainfield, they had listed 99 species. These included a Woodcock (*Philohela minor*) which they heard give the full courtship performance about three times—a late date; a Least Sandpiper (*Pisobia minutilla*); an unusual number—about 30 each—of Spotted and Solitary Sandpipers (*Actitis macularia et Helodromas s. solitarius*); two Yellow-bellied Flycatchers (*Empidonax flaviventris*) and a Mocking-bird (*Mimus p. polyglottus*). Their *Mniotiltidæ* included the same 24 species they had noted each of the two previous years, and two additional, Golden-wings (*Vermivora chrysoptera*) and a Prairie (*Dendroica discolor*). The number of Tennessee Warblers (*Vermivora peregrina*), six, was nearly twice as many as either observer had noted in all his previous springs. The most striking absentees were the Green Heron (*Butorides v. virescens*) and the Kingfisher (*Ceryle a. alcyon*).

Mr. Hix said† that on the 13th in the adjoining Dead River district he and Dr. Wm. H. Wiegmann had noted 88 species, including two Tennessee Warblers, and, on the next day, three White-crowned Sparrows (*Zonotrichia l. leucophrys*).

Mr. Herbert K. Job told of two Glaucous Gulls (*Larus hyperboreus*) he had watched for a half-hour March 18 in the harbor at New Haven, Conn.; they were with Herring and Black-backed Gulls (*L. argentatus et L. marinus*).

* See "Plainfield, N. J., Mid-May Bird Census, 1916," Wilson Bulletin, 1916, 80–81.

† See "New Jersey Census," Wilson Bulletin, 1916, 145–146.

Mr. Cleaves spoke of finding young Killdeer (*Oxyechus vociferus*) on early dates on Staten Island,—May 7 at Princes Bay and half-grown birds found by Mr. Harold K. Decker on the 21st at West New Brighton.

The speaker of the evening was Mr. F. D. Murphy; his subject, "Big Game Mammals of the Anglo-Egyptian Sudan." From experience gained in many years' residence in that region, Mr. Murphy related much that as a sportsman he had learned concerning the hunting and other habits of hyænas, lions and other big beasts.

October 10, 1916.—The President in the chair. Twelve members (Dr. Dwight and Messrs. Bowdish, Chapin, Chubb, Cleaves, Griscom, Hix, Marks, J. T. Nichols, Philipp, Rogers and Woodruff) and two visitors present.

Mr. Hix proposed the name of Mr. L. N. Nichols of the New York Public Library for Resident Membership; it was referred to the Membership Committee.

The Secretary announced that the manuscript of the minutes of the year ending March 14, 1916, for the next *Abstract*, was ready for the press, and asked whether it should be published at once, alone, or be held for the report of the Bird-Banding Association, which, Mr. Cleaves said, could not be got ready within two months. It was voted to publish an *Abstract* at once, to consist only of minutes unless the manuscript of recent papers presented to the Society by Dr. Wm. K. Gregory or Mr. R. C. Murphy, or both, could be secured.

Mr. Woodruff told of a Winter Wren (*Nannus h. hiemalis*) which had entered his house in Manhattan September 27. It was soon tame enough to perch on his finger, and presently flew out through a window opened for it. Mr. Chapin remarked that in the Congo the occasional birds that strayed into houses always proved to belong to species not of the cleared land about the houses, but of the forest or at least of the second-growth.

Mr. Chubb recorded the visit of three American Egrets (*Herodias egretta*) to the flooded area in the southeast corner of Broadway and 242d Street this summer. They arrived July 16 and remained, except for about a week, the rest of the

summer. Two had disappeared, but one was still there at least as late as October 7.

Mr. Hix reported a male and two female Blue-winged Teal (*Querquedula discors*) at Long Beach, L. I., September 10.

Mr. Rogers described a census he had taken of breeding birds within four miles of Crosswicks, N. J., June 3–11, 1916. The idea was to spend the morning hours at the height of the nesting season in covering most of the area by a carefully mapped-out series of routes, keeping count as accurately as possible of the number of *pairs* noted of each species. While the resulting totals of course did not include all the birds along the routes taken, to say nothing of all those in the area, it was believed that the figures obtained were sufficient to indicate closely the relative abundance of the various species and to serve as a basis for comparison with a future census over the same ground or with any similar one from some other part of the country. The single pair of Baltimore Orioles (*Icterus galbula*) observed indicated a decrease from the numbers the speaker had found about Crosswicks in previous years; the seven scattered pairs of Bobolinks (*Dolichonyx oryzivorus*) were apparently the first ever known to nest in New Jersey south of Princeton Junction. Two newly-hatched Mourning Doves (*Zenaidura macroura carolinensis*) were found to have an egg-tooth on each mandible instead of just the one on the upper customary among birds. (See No. 44060, collection Jonathan Dwight.)

Mr. Chapin remarked that the Honeyguides (*Indicatoridæ*) had on each mandible an egg-tooth much longer than those of other birds, and hooked.

Mr. Griscom spoke of a census of breeding birds recently taken on the Cornell University campus, which showed almost identical numbers in two successive years.

Mr. Cleaves brought up the subject of bigamy in House Wrens (*Troglodytes a. aëdon*), giving instances from his observations during the past summer. Others present had noticed the same thing, and agreed that it was not infrequent, but by no means the rule.

October 24, 1916.—The President in the chair. Thirteen

members (Dr. Dwight and Messrs. Ball, Bowdish, Chapin, Chubb, Cleaves, Griscom, Heller, Hix, Marks, J. T. Nichols, Rogers and Weber) and thirty visitors present.

Mr. L. N. Nichols, whose name had been proposed at the previous meeting, was elected to Resident Membership.

Mr. Hix reported Wood Ducks (*Aix sponsa*) to the number of about 25 at Van Cortlandt Park October 21; and Mr. Griscom a Magnolia Warbler (*Dendroica magnolia*) at Long Beach, L. I., the 27th.

Mr. Chubb announced the final departure of the American Egrets (*Herodias egretta*) from Van Cortlandt Park; the last to go was last seen on October 9.

Mr. Nichols spoke of the unusually early arrival of ducks of the genus *Marila* along the south shore of Long Island in October and recorded the following game birds killed at Mastic by Dr. Rolfe Floyd: an immature Hudsonian Godwit (*Limosa hæmastica*) October 6, a Canvasback (*Marila vallisneria*) the 11th (the earliest Long Island record) and two Shovelers (*Spatula clypeata*) the 14th (an early date for the Island).

Mr. Bowdish at Demarest and Mr. Rogers on the Rahway River above Millburn had each seen a Solitary Vireo (*Lanivireo s. solitarius*) October 22.

Mr. Weber and Mr. Rogers spoke of the unusual abundance of Pine Siskins (*Spinus pinus*) and Red-breasted Nuthatches (*Sitta canadensis*) in this region this autumn; and Mr. Weber remarked on a scarcity of Red-eyed Vireos (*Vireosylva olivacea*) about Palisades Park this summer and recorded a Barn Swallow (*Hirundo erythrogastra*) captured there which had been banded last year on Staten Island.

Mr. Rogers reported a Blue Grosbeak (*Guiraca cærulea*) in brown plumage seen by Mr. J. M. Johnson and himself on Long Beach, L. I., October 15. The bird permitted examination at from 25 to 40 feet for as long as the observers pleased.

Mr. Samuel H. Chubb gave the evening's lecture, on "Possibilities in Bird Photography in New York City." The speaker's lantern-slides included photographs of nesting Sparrow Hawks (*Falco s. sparverius*), Kingfishers (*Ceryle alcyon*) and others about his home at Kingsbridge, of a cock

House Sparrow (*Passer domesticus*) which had been coming for many months to his window-sill in the American Museum, and of the three American Egrets that visited Van Cortlandt Park last summer.

November 14, 1916.—Meeting omitted owing to conflict with that of the American Ornithologists' Union.

November 28, 1916.—The President in the chair. Thirteen members (Dr. Dwight and Messrs. Chapin, Chubb, Granger, Griscom, Hix, J. M. Johnson, Marks, J. T. Nichols, L. N. Nichols, Philipp, Rogers and Woodruff) and seven visitors present.

Dr. Dwight proposed for Resident Membership the name of Mr. George Gladden of Brooklyn; it was referred to the Membership Committee.

Mr. Griscom recorded a Lapland Longspur (*Calcarius l. lapponicus*) and Black-bellied Plover (*Squatarola squatarola*) seen by himself and Mr. J. T. Nichols at Long Beach, L. I., November 26.

Mr. J. T. Nichols had attended a meeting of the Nuttall Ornithological Club at Cambridge the previous evening and spoke of the reports of Evening Grosbeaks (*Hesperiphona v. vespertina*), Pine Grosbeaks (*Pinicola enucleator leucura*), Red Crossbills (*Loxia curvirostra minor*), Redpolls (*Acanthis*) and Brown-cap Chickadees (*Penthestes hudsonicus*) around Boston.

Mr. Rogers spoke of the following reports of Brown-cap Chickadees on November 12 in southeastern New York: at Rhinebeck by Mr. Maunsell S. Crosby; a probable one below Irvington by himself; two in Van Cortlandt Park by a young friend of Mr. Hix; and one on University Heights by Mr. T. Gilbert Pearson. The southernmost previous record had been Poughkeepsie, and there only in 1912–'13.

Several members spoke of the effect of airplanes upon birds. Mr. J. T. Nichols said that at the aviation grounds on Long Island the only time he had ever seen birds heed one was when a flock of about 100 Crows (*Corvus b. brachyrhynchus*) changed their course to avoid one. Mr. Griscom stated that airplanes had about driven ducks away from Cayuga Lake, and Mr.

Granger remarked that Mr. C. William Beebe had had a Blue Jay (*Cyanocitta c. cristata*) try to alight on his machine while in the air.

Mr. Charles L. Camp presented the evening's paper, "The Origin and Dispersal of California Reptiles." His many maps illustrated the life-zones of the State and the corresponding ranges of a large number of its reptiles and batrachians, and many of the animals themselves were shown to the society by lantern-slides. Of particular interest were an arboreal salamander (*Aneides lugubris*), which lives in natural cavities in oaks, where it lays its eggs, its climbing assisted by its prehensile tail; and a tree frog (*Hyla arenicolor*) which has entirely forsaken trees to live on the bare rocks near the bottom of narrow canyons. The speaker also showed an alcoholic specimen of a very rare toad, *Ascaphus truei*.

Considerable discussion followed.

December 12, 1916.—The President in the chair. Eight members (Dr. Dwight and Messrs. Chapin, Cleaves, Fleischer, Granger, Hix, L. N. Nichols and Rogers) and three visitors present.

Mr. George Gladden, whose name had been proposed at the previous meeting, was elected to Resident Membership.

Mr. Cleaves reported the arrival on Staten Island of the Brown-cap Chickadee (*Penthestes hudsonicus*). He had seen four in the Moravian Cemetery, New Dorp, on December 5 and twice subsequently, but two had been first seen there by Mr. Decker on the 2d.

Mr. Rogers recorded a lone Red Crossbill (*Loxia curvirostra minor*) flying westward over Short Hills, N. J., December 3; and on the 10th, a flock of five hundred Cowbirds (*Molothrus a. ater*) at Englewood.

In the absence of Mr. J. T. Nichols, Mr. Rogers read his account* of the occurrence and behavior of the Hermit Spadefoot (*Scaphiopus holbrooki*) at Mastic, L. I., the previous summer, where it had appeared several times, and more than once in the same pool.

* See "Spade-foot Toad at Mastic, Long Island," *Copeia*, June, 1917, 59–60.

Mr. L. N. Nichols gave a summary of his observations on the Arctic Three-toed Woodpecker (*Picoides arcticus*) and others of the family in the Adirondacks.

Mr. Chapin mentioned a curious habit of Turtle Doves (*Turtur*) in the Congo, two species of which would come regularly to eat the soil at a spot where salt had been stored.

Mr. Rogers described* the egg-laying and burying operations of a Painted Turtle (*Chrysemys picta*) as observed by him at Runyon, N. J., on July 4 last.

Mr. Hix presented some notes on Van Cortlandt Park birds, including a Prairie Horned Lark (*Otocoris alpestris pratincola*), seen on the ball-field July 29, 1916. The number of Kingbirds (*Tyrannus tyrannus*) collecting there in the autumn migration is remarkable, at times as many as five hundred being present, chiefly in the bushy area above the Lake. The breeding Crested Flycatchers (*Myiarchus crinitus*), Blue-winged Warblers (*Vermivora pinus*) and Chats (*Icteria v. virens*) seem to have decreased in numbers in the Park.

Mr. Cleaves distributed a questionnaire for information regarding Purple Martin (*Progne s. subis*) colonies within fifty miles of Staten Island.

December 27, 1916.—The President in the chair. Nine members (Dr. Dwight, Dr. F. M. Chapman and Messrs. Cleaves, Gladden, Griscom, Hix, Lang, Marks and Rogers) and twelve visitors present.

Mr. Marks proposed the name of Mr. L. D. Ingalls, of Arlington, N. J., for Resident Membership; it was referred to the Membership Committee.

Mr. Griscom recorded a Chipping Sparrow (*Spizella p. passerina*) seen by him and Mr. J. T. Nichols at East Rockaway, L. I., December 24, and on the same day eleven Pintail (*Dafila acuta*) at Lynbrook, including six males, and four Canvasback (*Marila vallisneria*) at Mastic.

Large numbers of Redpolls (*Acanthis linaria*) were reported present in northern New Jersey and on Staten Island. Mr. Cleaves had seen 145 on Staten Island on December 24, including one flock of sixty feeding on ragweed.

* See "Notes on Three Common New Jersey Turtles," *Copeia*, August, 1917, 74–76.

Owing to the great reception to the American Association for the Advancement of Science at the Museum on this evening, and the small attendance at our own meeting, it was decided that the scheduled paper by Mr. Herbert Lang be postponed to the following meeting, giving an opportunity for general discussion of topics of interest.

Mr. Rogers gave an account* of the finding by Mr. LaDow and himself, last July, of a Chimney Swift (*Chætura pelagica*) nest several feet down on the concrete side of a well near Westwood, N. J. The old bird at home apparently tried to frighten the intruders away from the mouth of the well by a loud rumbling noise of wings. Several members discussed this possibility.

Mr. Griscom told of a Spotted Sandpiper (*Actitis macularia*) chasing flies on an ocean liner far at sea, and Mr. Decker of a Red-breasted Nuthatch (*Sitta canadensis*) he had watched picking flies from the grease of the rigging of a sailing vessel along the coast.

In response to an inquiry by Mr. Griscom, several members spoke of having heard the Barred, Great Horned and Screech Owls (*Strix varia, Bubo virginianus et Otus asio*) and also the Whip-poor-will (*Antrostomus vociferus*) calling in the daytime, while *Glaucidium* was said by members who had been in its range to whistle regularly in the sunlight.

January 9, 1917.—The President in the chair. Twelve members (Dr. Dwight and Messrs. Gladden, Griscom, Hix, Lang, Marks, J. T. Nichols, L. N. Nichols, Philipp, Rogers, Weber and Woodruff) and sixteen visitors present.

Mr. L. D. Ingalls, whose name had been proposed at the previous meeting, was elected to Resident Membership.

The name of Mr. Gerald H. Thayer was proposed for Resident Membership by Mr. Griscom, and was referred to the Membership Committee.

The Secretary read a communication from the Women's League for the Protection of Riverside Park, urging this Society to write to the Secretary of the Board of Estimate and Apportionment of New York City a formal protest against the

* See "Chimney Swift Nesting in a Well," *Auk*, XXXIV, 337.

proposed changes in the New York Central Railroad along the Hudson, on the ground that they threatened seriously the Park. After considerable discussion, it was voted that the Secretary sign, in the name of the Society, and send in a brief petition sent it by the League, urging that no plan be considered that would interfere with the preservation of the Park.

Mr. Weber reported that Evening Grosbeaks (*Hesperiphona v. vespertina*) had visited his back yard at Palisades Park, N. J., December 21, and had been fed on corn, whose kernels they cracked. Two days later he found a flock of ten at Fort Lee. He also mentioned a Lapland Longspur (*Calcarius l. lapponicus*) at Long Beach January 1.

Numerous additional recent records of Redpolls (*Acanthis linaria*) in the vicinity of New York City were given by members, and Mr. Griscom mentioned two seen by Mr. J. T. Nichols and himself on Currituck Beach, N. C., December 31, (the second record for the State), and Pine Siskins (*Spinus pinus*) seen there the following day.

Mr. J. T. Nichols recorded a Yellow Palm Warbler (*Dendroica palmarum hypochrysea*) seen by him at Garden City January 3, the first winter record for that subspecies on Long Island.

Dr. Wm. H. Wiegmann reported an Orange-crowned Warbler (*Vermivora c. celata*) in the Moravian Cemetery, New Dorp, Staten Island, January 8, and apparently a different individual there the next day. Markings, form of bill and actions were especially noted.

Mr. L. N. Nichols stated that his son had seen on Christmas Day a Rusty Blackbird (*Euphagus carolinus*) in Bronx Park and a drake Canvasback (*Marila vallisneria*) off Clason Point, Bronx, and on January 6 two Pine Grosbeaks (*Pinicola enucleator leucura*) in Bronx Park. The colony of Night Herons (*Nycticorax nycticorax nævius*) in the Park had increased in numbers; no fewer than seventy-one were counted January 1.

Mr. Rogers recorded a Brown-cap Chickadee (*Penthestes hudsonicus*) seen by him at Englewood January 1, probably the individual seen in the same spot December 23 by Mr. Lester Walsh and Mr. George Schoonhaven of the Brooklyn

Bird-Lovers' Club. He remarked that all the specimens taken in Massachusetts and southward this winter, including one from Plainfield, N. J., had proved to be *P. h. nigricans*, so that the Englewood bird was almost certainly of that form, especially as its notes had seemed to him different ("distinctly harsher and more incisive, less drawled, almost explosive") from those of *P. h. littoralis*, which he had heard repeatedly in New Hampshire as recently as last September. He proposed that, owing to the confusion due to using "Hudsonian Chickadee" both for *P. hudsonicus* and for *P. hudsonicus hudsonicus*, the species (*P. hudsonicus*) be called the "Brown-cap Chickadee," *P. h. hudsonicus* the "Hudsonian Brown-cap Chickadee," *P. h. nigricans* the "Labrador Brown-cap Chickadee," etc.

Mr. Gerald Thayer spoke of seeing White-winged Crossbills (*Loxia leucoptera*) at Roslyn, L. I., January 2.

Mr. Herbert Lang gave a paper "On the Square-lip Rhinoceros and the Giant Eland," giving an account of the history of our knowledge of the Rhinoceros (*Ceratotherium simum*), its structural and other differences from the Hook-lip species (*Diceros bicornis*), and many notes on its habits. This was followed by a briefer account of the appearance and habits of the Eland (*Taurotragus derbianus gigas*). The paper was illustrated with many colored lantern-slides of the animals and their haunts.

January 23, 1917.—The President in the chair. Fourteen members (Dr. Dwight, Dr. F. M. Chapman and Messrs. Chubb, Cleaves, Davis, Fleischer, Gladden, Griscom, Hix, Ingalls, F. E. Johnson, Marks, Rogers and Thayer) and forty-eight visitors present.

The Secretary read from the Chief Clerk of the Board of Estimate and Apportionment, City of New York, an acknowledgment of the Society's recent communication concerning the proposed changes in Riverside Park.

Mr. Gerald H. Thayer, whose name had been proposed at the previous meeting, was elected to Resident Membership.

The President appointed Mr. Woodruff and Mr. Rogers a Committee to make arrangements for the Annual Dinner.

Mr. Hix reported an Orange-crowned Warbler (*Vermivora c.*

celata) still present January 20 in the Moravian Cemetery at New Dorp.

Dr. Frank M. Chapman gave an account of "An Ornithological Reconnaissance in South America," a six months' American Museum expedition he had led during the past year. The party had visited Ecuador, Peru, Bolivia, Chile, Argentina and Brazil. Dr. Chapman spoke particularly of the immense multitudes of water-fowl along the Peruvian coast. The lecture was illustrated with lantern-slides and with specimens of interesting birds.

February 13, 1917.—Joint meeting with the Section of Biology of the New York Academy of Sciences, at the invitation of the Section. In the absence of the President of the Linnæan Society and of the Chairman of the Section of Biology, Dr. F. A. Lucas was asked to preside. Sixteen members (Prof. H. F. Osborn and Messrs. Chapin, Chubb, Cleaves, Gladden, Granger, Heller, Hix, J. M. Johnson, Lang, Marks, Murphy, J. T. Nichols, L. N. Nichols, Rogers and Weber) of the Society and thirty members of the Section and visitors present.

The regular business of the Society and of the Section was waived to proceed at once to a paper* by Dr. W. D. Matthew (who presented it) and Mr. Walter Granger on "A Gigantic Bird from the Eocene of Wyoming." Dr. Matthew exhibited and described a skeleton of *Diatryma*, fairly complete except for lacking the sternum, found by an American Museum expedition in 1916. As this genus had been known only from a few bones, this was the first chance for anything like an adequate conception of it. The bird had the height of *Struthio*, but a shorter neck, far larger head, enormous bill, broader pelvis, and four well-developed toes on each foot. Superficially it resembled *Phororachus*, but the bill seemed rather for crushing than for tearing, and the claws were comparatively short, straight and blunt. A large chart, lantern-slides and skeletons of struthious and other birds were used in

* See "The Skeleton of Diatryma, a Gigantic Bird from the Lower Eocene of Wyoming," *Bull. Am. Mus. Nat. Hist.*, XXXVII, Art. XI, 307–326; also (less technical), "A Giant Eocene Bird," *Amer. Mus. Journal*, XVII, 417–418.

illustration. Dr. Matthew concluded that *Diatryma* was most probably a Carinate, possibly most nearly related, among existing forms, to *Cariama*. Discussion followed by the speaker, Prof. Osborn, Dr. Lucas, Mr. C. Wm. Beebe, Mr. Weber and others as to *Diatryma's* mode of life. It was agreed that it was probably neither raptorial nor a swift runner, and that there were indications of a possible littoral habitat, where the powerful beak would be useful in crushing turtles and large molluscs.

February 27, 1917.—The Vice-President in the chair. Eleven members (Messrs. Cleaves, Gladden, Granger, Hix, J. M. Johnson, Lang, J. T. Nichols, L. N. Nichols, Philipp, Rogers and Woodruff) and forty-six visitors present.

Mr. Rogers proposed the name of Mr. Leo E. Miller, of the American Museum of Natural History, for Resident Membership; it was referred to the Membership Committee.

Mr. Gladden spoke of noticing recently for the first time a note of the Tufted Tit (*Bæolophus bicolor*) that resembled the Bluebird's (*Sialia sialis*) autumnal call, and Mr. Decker remarked that he had just had the same experience and that the note had also suggested to him one of the Blue Jay's (*Cyanocitta cristata*).

Mr. Decker reported three male White-winged Crossbills (*Loxia leucoptera*) in the big wood at Great Kills, Staten Island. They had been found by Mr. Cleaves, and had been seen four times since, by Mr. Cleaves, Mr. Decker and Mr. Rogers, always feeding on Sweet Gum (*Liquidambar Styraciflua*) seeds (most recent date, February 25). Mr. Decker had also seen on the 25th a flock of sixteen Prairie Horned Larks (*Otocoris alpestris pratincola*) at Castleton Corners in the interior of the Island, carefully identified at a few feet with 8x glasses and compared with a flock of the typical form (*O. a. alpestris*) seen later the same day on the shore.

Mr. Rogers recorded a flock of five Short-eared Owls (*Asio flammeus*) seen by him and Mr. J. M. Johnson flying about over the meadows at Long Beach January 28, and on the same day three Sanderling (*Calidris leucophæa*) on the beach; also, with Mr. W. DeW. Miller, a Labrador Brown-cap Chickadee

(*Penthestes hudsonicus nigricans*) in a new locality, the Myrica Grove on the summit of the First Watchung Mountain between Westfield and Summit, February 4.

Dr. Wm. K. Gregory gave the Society a lecture* on "The Evolution of the Human Face." With lantern-slide illustrations, and beginning with *Paramecium* (which has the first feature of a face, the mouth), he traced the successive appearance of the eyes and other features, culminating with the prominent chin, which appears only in modern man. While a true face is found at least as low as the insects, the mammals alone have a muscular face and therefore the only face capable of changing expressions. The speaker showed that the change from the anthropoid face was gradual through that of primitive man to our own, and involved chiefly increased cranial capacity, reduction of the supra-orbital ridges, and retreating of the whole face from a position almost wholly farther forward than the brain-case to one under it. Discussion followed.

March 13, 1917.—Annual Meeting. The President in the chair. One Honorary Member (Dr. A. K. Fisher), twenty-five Resident Members (Dr. Dwight, Dr. Morris and Messrs. Abbott, Chapin, Cleaves, Davis, Fleischer, Gladden, Granger, Helme, Hix, F. W. Hyde, F. E. Johnson, J. M. Johnson, Lang, Marks, Miller, Murphy, J. T. Nichols, L. N. Nichols, Philipp, Rogers, Thayer, Weber, and Woodruff) and seventeen visitors present. The meeting followed immediately the Fifth Annual Dinner, held in the Mitla Room of the American Museum and attended by twenty-five† members and fourteen guests.

Mr. Leo E. Miller, whose name had been proposed at the previous meeting, was elected to Resident Membership.

Mr. Rogers proposed, and it was unanimously voted, with applause, that the name of Mr. William Dutcher be transferred from the list of Resident to that of Honorary Members.

The Secretary read the resignation from Resident Membership of Mr. Geer and of Mr. Harper, owing to their present residence in Boston and Washington respectively.

Mr. Cleaves proposed the name of Mr. Walt F. McMahon for

* See this title in *Amer. Mus. Journal*, XVII, 376–388.

† Mr. Philipp was not present.

Resident Membership; it was referred to the Membership Committee.

The Secretary then gave his Annual Report, as follows:

Although the Linnæan Society omitted a meeting owing to conflict with that of the American Ornithologists' Union, the total attendance at the fifteen meetings held during the past year was 507, the largest since long papers of general interest were presented twice a month. The Fourth Annual Dinner was attended by twenty-five members, seven guests of the Society and thirteen guests of individual members, besides Dr. J. A. Allen, a Resident Member and the Society's guest of honor, to whom was presented the Linnæan medal in recognition of his services to mammalogy and ornithology. Twenty-two members and eighteen visitors attended the Annual Meeting the same evening. At the remaining fourteen meetings the attendance averaged thirty-three, also the largest in five years; though the average of members was only a little over twelve, a fractional falling off from last year but still 20 per cent. greater than that of either of the two years previous. The largest number present at any one meeting was sixty-two, on January 23 (of members, sixteen, February 13); the smallest was eleven. The first February meeting was held jointly with the Section of Biology of the New York Academy of Sciences, by invitation of the latter.

The Society has during the past year lost by death four Resident Members: Dr. Gustav Langmann, Mr. Wm. Purdy Shannon, Mr. Alex. H. Stevens and Mrs. Cynthia A. Wood; five have resigned and one has been dropped automatically for arrears in dues. Dr. J. A. Allen has been transferred from the Resident to the Honorary list and five new Resident Members have been elected. The Membership list now stands: Resident, 90; Corresponding, 26; Honorary, 3; total, 119.

Ten papers of some length have been presented before the Society,—three on birds, three on mammals, one on reptiles, one on evolution and two miscellaneous. In addition, there have been nine brief papers,—seven on ornithology, two on herpetology. The papers were illustrated with lantern-slides, museum specimens, charts, etc.

At the first meeting in October it was voted to publish with our "Abstract" Number 28 Mr. R. C. Murphy's account of his Lower California expedition, but as Mr. Murphy was unexpectedly not able to complete its preparation for the press till the present month, it has not yet been sent to the printers.

CHARLES H. ROGERS,
Secretary.

The Treasurer then read his Annual Report, showing a balance in the Treasury of $2,439.65.

The President called for nominations for the office of President. Mr. J. T. Nichols moved that the Secretary be in-

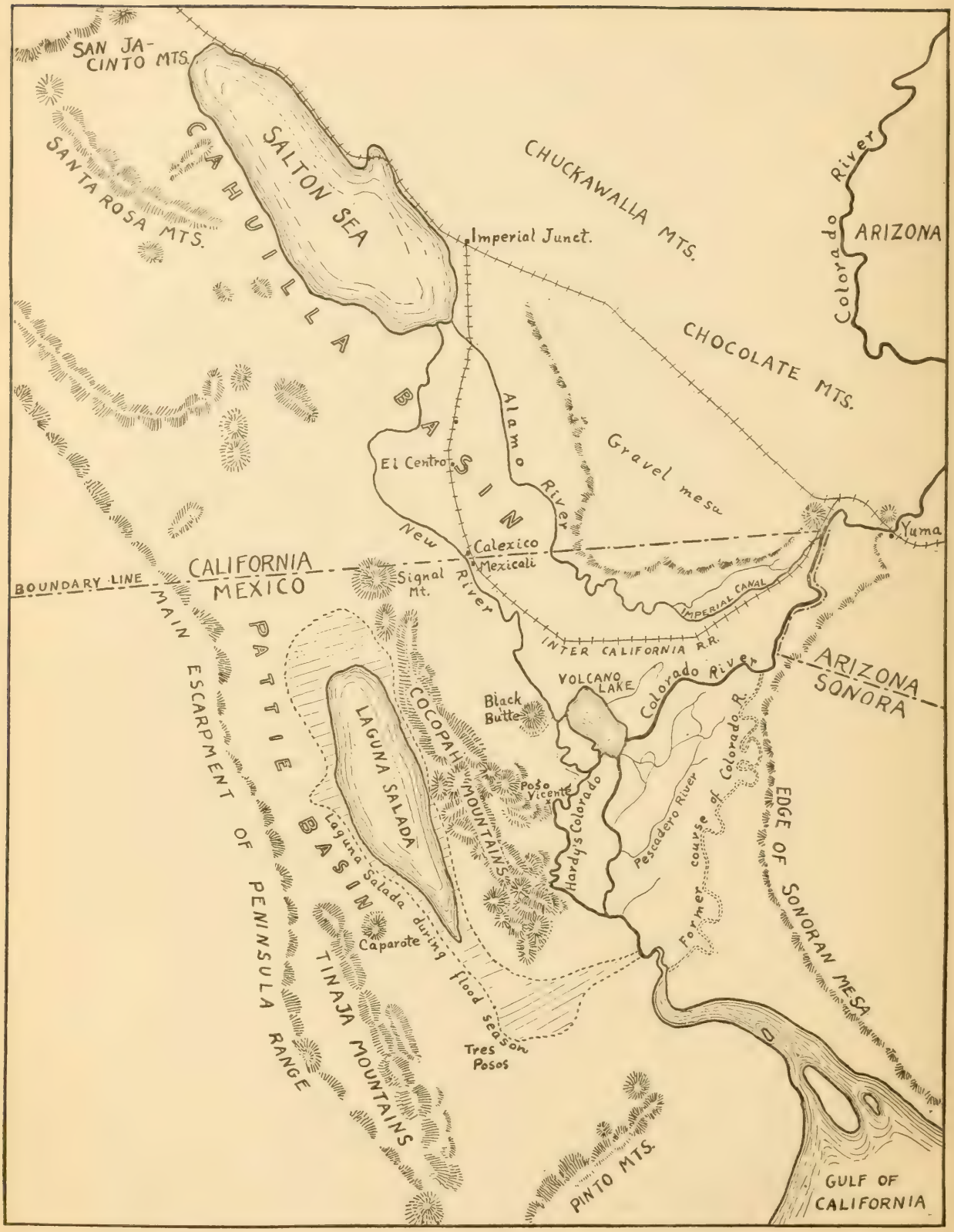
structed to cast a ballot for the continuation in office of the officers of the past year. This was carried, the officers for the ensuing year standing as follows:

PRESIDENT, Jonathan Dwight.
VICE-PRESIDENT, Julius M. Johnson.
TREASURER, Lewis B. Woodruff.
SECRETARY, Charles H. Rogers.

Mr. Miller showed the Society a selected series of lantern-slides from his South American photographs of scenery, cities, Indians, birds, mammals, etc., and gave a brief account of the most interesting of his observations concerning them.

The meeting adjourned at 9:40 P.M., but most of the members and guests lingered as an informal gathering till about 10:30.

Plate I.



The Desert of the Colorado, copied, with alterations, from a map by Godfrey Sykes in MacDougal's "The Salton Sea".

Natural History Observations from the Mexican Portion of the Colorado Desert

With a Note on the Lower Californian Pronghorn and a List of the Birds.

By Robert Cushman Murphy

Brooklyn Museum.

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Introduction.

The desert that lies west of the lower stretches of the River Colorado, partly within the southeastern corner of the State of California and partly in Mexico, has been, since Tertiary times, the driest section of the North American Continent. This region, to which the name "Colorado Desert" [1] was long ago applied, extends in the form of an

[1] The region is defined by Blake in MacDougal's "Salton Sea," page 6: "The name 'Colorado Desert' was given to this region by the writer in 1853. This was before the State of Colorado received its name. It was deemed most appropriate to connect the name of the Colorado River with the region, inasmuch as the desert owes its origin to the river by the deposition of alluvions and the displacement of the sea-water.

"A tendency is shown by some writers to extend the area known as the Colorado Desert so as to include the arid regions north of it, especially the mountainous region along the Colorado and the Mohave, partly known to-day as the 'Mohave Desert.' This was not the intention or wish of the author of the name. It was intended to apply it strictly to the typical desert area of the lacustrine clays and alluvial deposits of the Colorado where extreme characteristic desert conditions prevail, such as arid,

arid depression, a quarter of which is below the level of the sea, from the San Jacinto, Chuckawalla, and Chocolate Mountains on the north, southward nearly two hundred miles to the Gulf of California. On the east it is bounded by the Sonoran Mesa, and on the west by the main escarpment of the Rocky Mountain coastal ridge which comes downward from the San Gorgonio Pass as the backbone of the Lower Californian peninsula. In the south-central part of this dry expanse is a range of mountains, called the Cocopahs, running in a general northerly and southerly direction, and dividing the desert into two branches which merge in the south at the mouth of the Colorado. The larger, northern branch, the chief part of which comprises the Salton Basin, in Imperial County, California—but with a Mexican appendage formed of the Colorado Delta—is known as the Cahuilla Valley. The smaller, southwesterly division of the desert, lying between the Cocopahs and the Peninsula Range, has been distinguished by the name "Pattie Basin."

In the Salton Basin, and doubtless also in its counterpart west of the Cocopahs, the average annual rainfall is less than three inches, and even this is mainly in the form of cloudbursts. During the last few centuries the lower areas of these basins, one of which sinks to a depth of more than two hundred and fifty feet below sea-level, have been alternately submerged and desiccated many times. Further back in geologic history, probably in the middle Tertiary, the whole of the Colorado Desert appears to have been a great sea, above which the peaks of the Cocopahs may have jutted as islands, and which received the silt-laden waters of the Colorado River at some point far above the site of Yuma, Arizona. Through the pass between the San Jacinto and San Bernardino Mountains, where reefs of fossil oysters are now to be found a thousand

treeless plains, old lake-beds, and sand-hills—such conditions as are found in the Sahara of Africa and in the delta regions of the Nile. The appellation may properly be confined to the regions reached by the deposition of the silt of the Colorado, whether in the form of deltas or at the bottom of ancient lakes. I should also include the bordering detrital slopes from the contiguous mountains. So restricted, the area is practically coterminous with the ancient beach-lines and terraces of the lakes which occupied the valley."

feet above the floor of the valley, this sea was perhaps connected with the Pacific Ocean, thus making an island of Lower California.

With the uprising of the land and retreat of the waters, the ancient sea first was cut off from direct continuity with the Pacific, and subsequently the Cahuilla and Pattie Valleys became separated north of the Cocopah Mountains, their waters still being continuous in the south with the Gulf of California. But the Colorado River deposited its incalculable tons of alluvium[1] along the southern margin of the Cahuilla Valley and began to build up the great delta that eventually formed a land junction with the Pattie Basin, south of the Cocopahs. In this constructive process the Colorado was materially aided by the huge tidal bores characteristic of the head of the Gulf of California, these tending to form successive barriers of marine deposits behind which the river might spread out during its overflow, and drop its burden of suspended soil over the widest possible area. Thus the two basins of the Colorado Desert came to be landlocked and to contain each a residual lake, of which that occupying the Cahuilla is now called the Salton Sea, that of the Pattie the Laguna Salada, or, as the native Indians say, "Laguna Maquata."

As stated above, these basins have been again and again completely dried up, a condition which has recently prevailed up to the year 1905, when a winter flood of the Colorado broke the barriers of an insufficient irrigation canal supplying the cultivated part of the Cahuilla Valley, known as the Imperial Valley. The water made new and destructive cuts across the plain, and turned practically the whole volume of the river into the Salton Sink. Not until 1907, after an enormous expenditure of money, could the flow be checked, and by that time the Salton Sea had attained such size that it will hardly have entirely evaporated before the year 1930.[2] During the deflection of the river, moreover, its former bed,

[1] The sediment brought down by the river has been estimated as sixty million tons yearly (MacDougal, 1906).

[2] This calculation does not take into consideration the ever-increasing drainage from irrigation canals, which may perpetuate the Salton Sea.

just west of the Sonoran Mesa, had become so choked with vegetation and a heavy deposit of silt from the standing water, that, when finally turned back from the Imperial Valley, the Colorado sought new outlets towards the southwest and broke into the channels of a maze of rivulets in the delta, among which the Hardy River now carries by far the greatest bulk of water. This stream skirts the southern end of the Cocopah Mountains, and, when surcharged by the spring freshets, it spills over the flood-plain on its western bank into the Pattie Basin, there increasing the area of the Laguna Salada, which is again reduced, after the subsidence of the river, by rapid evaporation.

It thus happens that the river water in the whole of the Colorado Delta, from near the United States borderline to the Gulf of California, is in a condition of unstable equilibrium, and is likely to break out afresh in a time of extreme flood and once more to submerge the vast acreage of arable land in the lower, adjoining basins. Owing to the presence of high ground along the border, the inhabitants of the Imperial Valley are dependent for their irrigation upon a canal that passes through Mexican territory, and there are those who have recommended the purchase by the United States of the southern half of the Colorado Desert in order to safeguard an American population of more than fifty thousand people, and millions of acres of the richest, most easily tilled soil known in the western hemisphere. In the words of one writer, "Nature has accomplished for the valley what man and his dikes have done for Holland," but vastly more human effort must yet be brought to bear before the Imperial farms and ranches can be thoroughly secured against the danger incident to an act of malice, or to a surcharged river combined with an exceptionally high tide in the estuary. At the present time a huge dam is being constructed to block a possible breach at Volcano Lake, Lower California, which has a higher altitude than much of the country to the northward. But south of this, and also west of the Cocopahs, lies perhaps the better portion of an American Nile flood-plain, where the only inhabitants are a handful of Indians, and where a readily

tillable soil, inexhaustible water supply, and a climate seemingly devised especially for intensive agriculture, offer potential opportunities the like of which perhaps do not exist elsewhere.

Biologically speaking, the Pattie Basin, lying wholly within the Mexican State of Baja California, is of particular importance because of its isolation, and because of the even slopes by which it ascends the enclosing mountain sides and the consequent wide range in the character of its xerophilous vegetation, which seems in general to be far more luxuriant than that of the Salton Basin. Here, too, owing to the absence of man, there exists a primeval desert fauna, of which only the pronghorn antelopes, mule-deer, and mountain sheep have been appreciably reduced in numbers by the incursions of big game hunters. It was into this interesting country that I went, in March, 1915, for the principal purpose of obtaining specimens of antelopes and other desert-living creatures that were desired for use in the Brooklyn Museum's exhibit of desert life.

During the course of a month, I made two trips across the border, the first taking me to the far side of the Pattie Basin, the second only to Volcano Lake and the meandering track of the upper Hardy River. On the first and longer trip my companion was Mr. Robert H. Rockwell, chief taxidermist in the Museum. The second trip was made with my wife, Grace E. Barstow Murphy.

Previous Investigations.

The natural resources, including the geology, botany, and zoölogy, of the country about the Salton Sea have been rather thoroughly investigated. So much can not be said of the Colorado Delta or of Pattie Basin, although several scientific expeditions have passed through the territory in the interests of the Desert Laboratory of the Carnegie Institution, the United States Biological Survey, and other organizations. The late Dr. Mearns, while a member of the International Boundary Commission, crossed the desert in March and April, 1894, and collected mammals at eleven stations south of this section of the Mexican line, one of the localities being at the

very mouth of the Colorado River. His observations are briefly recorded on pages 21, 22, 125–132, and elsewhere, in his monograph on "Mammals of the Mexican Boundary of the United States" (1907). Unfortunately no detailed publications have yet appeared concerning the results of the Biological Survey field work. The botanical studies of the Desert Laboratory parties, as well as the history of earlier investigation from the days of the Spanish explorers, have been summarized in MacDougal's important book "The Salton Sea" (1914), with citations of the principal published sources of information.

In February, 1905, Mr. Samuel N. Rhoads, of the Philadelphia Academy of Natural Sciences, made a boat trip from Yuma to the mouth of the Hardy River, his collections and notes subsequently forming the basis of a report on the birds and mammals of the delta (Stone and Rhoads, 1905). Sidelights on the general character of the country, its climate and fauna, have moreover been cast by numerous popular articles by American sportsmen in *Outing*, *Recreation*, *Field and Stream*, and similar non-technical periodicals.

Although not applying specifically to the Mexican portion of the Colorado Desert, a list by Van Rossem (1911) of winter birds of the Salton Sea, and more particularly an admirable treatise by Grinnell (1914) on the mammals and birds of the lower Colorado Valley, are of utmost importance to those interested in the zoölogy of the area.

Zonal, Faunal, and Associational Status of the Region.

Grinnell (1914) has confirmed the supposition that the country contiguous to the lower Colorado River should be assigned entirely to the Lower Sonoran Zone, and to the fauna designated as the Colorado Desert. The same limits undoubtedly apply to the section of northeastern Lower California described herein, although at the southern extremity of the region, west of the head of the Gulf of California, the relatively narrow riparian belt is bounded abruptly by highlands that rise to the Boreal Zone in the mountains of San Pedro Mártir.

A precise biotic study of the Colorado Delta and its adjacent flood-basins, such as I had no opportunity to attempt, would yield data for further elaboration of the associational areas into which Dr. Grinnell has so graphically and comprehensively divided the valley of the river along the whole extent of the California-Arizona boundary. His groupings are worth quoting for the bearing they have upon researches in the delta:

1. River Association.
2. Willow-Cottonwood Association.
3. Tule Association.
4. Arrowweed (*Pluchea sericea*) Association.
5. Quail-brush (*Atriplex lentiformis*) Association.
6. Mesquite Association.
7. Saltbush (*Atriplex polycarpa*) Association.
8. Creosote (*Larrea*) Association (Mesa).
9. Wash Association.
10. Saguaro (*Cereus giganteus*) Association.
11. Encelia (*E. farinosa*) Association (Rocky Hills).

Between Needles, California, and the vicinity of Yuma, Arizona, each of these belts is more or less continuous and definite, and each can be characterized in terms of position and botanic features, as well as by lists of the birds, and more particularly the resident mammals, that favor it. Along such a great straightaway valley as this reach of the river, a detailed ecologic system is rather easy of application, but in the Mexican portion of the Colorado Desert the physiographic conditions produce so high a degree of complexity that interpretation is perhaps possible only through taking account of the simpler state so well described by Grinnell. Thus in the delta, the enormous areas of marshy, occasionally flooded land, with a network of streams and sloughs, fresh and brackish lakes, and abundant aquatic vegetation, vastly increase the potential scope of the River Association. The same circumstances also cause the four succeeding areas of Grinnell's list, namely the Willow, Tule, Arrowweed, and Quail-brush Associations, to become involved almost beyond discrimination. Further complexity in the southern Colorado Desert, requiring a replacement or new combination of the associations appli-

cable to the valley north of Yuma, is due to such factors as the great sinks of the Salton and Pattie Basins, with their fluctuating saline lakes, extensive dune areas, and the high alkalinity of their soils; the existence of hot springs, mud volcanoes, and solfataras; the presence of an isolated mountain range practically surrounded by the delta and its neighboring basins; the unbroken, plant-covered slopes on the western side of Pattie Basin; etc.

Since I had no opportunity to trap small mammals during our hurried sojourn in Lower California, it would be rash for me to try to demarcate exact associations in the Pattie Basin and the borders of the fluvial land. Yet in comparing Rhoads's annotations, on twenty-one species of terrestrial mammals from the delta region, with Grinnell's more ample account of species inhabiting the river valley north of the international boundary, one is struck by certain reflections of the changed and unusual physiographic relations. For instance, two white-footed mice, *Peromyscus maniculatus sonoriensis* and *P. eremicus eremicus*, occupy well-defined and approximately exclusive strips of country along the Colorado between Needles and Yuma. *P. m. sonoriensis* is the bottom-land form, finding its optimum life-conditions in the Willow-Cottonwood Association, and occurring much less abundantly in the Arrowweed, Quail-brush, and Mesquite Associations. Grinnell trapped 65 specimens, and failed to find the species at any point beyond the mesquite belt. *P. e. eremicus*, on the other hand, is the upland-desert form, belonging altogether to associations outside the mesquite belt. The capture of 109 specimens showed that it finds its optimum in the Saltbush Association, and extends its habitat sparingly above.

Now in Lower California, Rhoads found *P. e. eremicus* plentiful in the Cocopah Mountains, where he took 19 specimens. He characterizes this mouse as a "rock-loving mountain species." *P. m. sonoriensis* was "excessively abundant in the bottoms," as might have been expected, but "four specimens were also trapped in the Cocopahs with the preceding species." Here then is at least slight evidence of an intermingling which doubtless obtains, in various botanic and

zoölogic phases, throughout a region where a low, intricate, subtropical delta, an arid and abrupt mountain range, and a barren, alkaline desert basin are in contiguity.

I should like to apply, in so far as possible, the principles of Grinnell's system to the present hasty reconnaissance of the Mexican portion of the Colorado Desert. Since I have little of a specific nature to report concerning the first five (River to Quail-brush) associational groups in the list, these may here all be combined under the broader ecologic heading of "Delta Area." The Mesquite Association, to be sure, belongs in part to the delta, but it also extends in its pure form ("orchard forest") over tracts many miles square, in the southerly part of the Salton Basin, from the plain south of the Alamo River almost to the northern point of the Cocopahs; and, again, over much of the low land in Pattie Basin. The Saltbush Association is in evidence in several parts of Salton and Pattie Basins, notably at the southeastern end of the latter, near the base of the Pinto Mountains. The Creosote Association comprises large expanses around the margins of both basins. As might be suspected, it is an unimportant element on the western border of the delta fan, below Volcano Lake and the Cerro Prieto. The Wash Association is especially well delimited, extensive, and botanically luxuriant on the rising land west of the Pattie Sink. It is also more or less distinguishable at points along the eastern side of the Cocopahs, and scantily elsewhere.

I observed no giant cactus during our whole journey south of the border, but there is a distinctive plant zone, very likely corresponding to the Saguaro Association, along the higher reaches of the stony incline below the eastern face of the Tinaja Mountains and Peninsula Range. Here *Fouquieria splendens*, in its most magnificent development, is far and away the predominant floral feature. The area may perhaps warrant the name "Ocotilla Association." Traces of it occur also on the lower slopes of the Cocopahs and at the foot of Black Butte.

Brief notes upon the several associational groupings, and their faunas, will be found in the following narrative and in the list of birds.

Narrative of the Trip.

Our guide on the journey to the Pattie Basin was Captain Edward W. Funcke, of San Ysidro, California, a man who has conducted scores of hunters into the mountains and hollow plains of northwestern Lower California, and has even made the long land pilgrimage to the southern end of the great peninsula. During his scouring of the country, he has learned the watering places of the native Indians, besides discovering several new ones for himself, and he possesses perhaps a more practical knowledge of the Mexican half of the Colorado Desert than any other American.

As manager of the pack train, the "captain" employed a taciturn Mexican called Pancho, a ranchman who understood the mentality of mules and burros to a degree that suggested close kinship. He was also reputed to be a great hunter, but, as subsequent events proved, his old-time Winchester must have had a crooked barrel or else he was the very worst shot in all Baja California. A third member of the captain's party was the camp cook, who answered to the name of Mac.

Colonel Esteban Cantù, Military Commandant (now Governor) of northern Baja California, courteously granted the necessary permission for our expedition, and on March 29, 1915, the morning after Mr. Rockwell and I had reached Calexico, all was ready for us to start into the desert. Our cavalcade comprised four horses, a mule, a hinny, and five burros, not counting one burro colt which carried no pack and which came only because its mother wouldn't go without it. The horses hardly measured up to the popular idea of fiery western steeds. On the contrary, they were rather prosaic, ambulatory beasts, whose virtue lay in their ability to keep burros on the move, and to find their own living in a land of sparse vegetation by browsing all night after they had travelled all day. Only the mount assigned to Mac had a properly picturesque appearance, for, although a weak-kneed brute, this rangy, pale-eyed, yellow and white, pinto horse had the look of a high-grade polo pony. Pancho rode a stalwart hinny, his own favorite, which together with the mule made

up the most valuable pair of animals in the outfit. A hinny has toughness, and power of subsisting on little water and less food, to about the same extent as a mule. The chief distinction between the two, outside of appearances, is temperamental, for the mule considers itself a horse, while the less egotistical hinny aspires only to be a burro. Thus is demonstrated the strength of filial instinct for the mother. One has but to lead a mare, and all the mules will follow; in like manner, the hinnies flock in the tracks of a she-ass.

Just across the borderline from Calexico, a sandy-haired, blue-eyed Mexican, with an automatic rifle and a belt full of cartridges, inspected our customs receipts, and then passed us along with salutations. We followed a road that led through six miles of reclaimed, cultivated fields, as fertile as the country on the American side of the line, until we came to the final artery of the Imperial irrigation system, at the edge of the desert. Its muddy water was the last supply this side of Hardy's Colorado, so we camped for lunch. Meadowlarks, at the outposts of their range, were singing in the alfalfa fields; we were to hear them no more until we had returned from the wilderness to the agricultural country of which they seem to be a part. Coots, scaup ducks, and baldpates were feeding in neighboring puddles of irrigation water, and ox-eyes pattered around the margins.

When we saddled and struck out southward, we crossed first several miles of rather dense mesquite (*Prosopis glandulosa*), the visible inhabitants of which were doves, gnatcatchers, and desert quail, with an occasional foraging owl (*Speotyto*). We were ascending, by imperceptible stages, the southerly slope of the Salton Sink, and were within a few miles of the gulch of the New River. Presently the cracked, periodically flooded soil of the mesquite groves gave way to sandy æolian areas in which the creosote bush (*Larrea tridentata*) was the dominant plant, although bunch-grass, chollas and prickly pears, one or more species of *Atriplex*, and small ocotillas, became increasingly common as we approached the Cerro Prieto (Black Butte). Vegetation of this general character prevailed as far south as a point east of the Borrego (Mountain

Sheep) Peak of the Cocopahs, from where the desert descended again to the Colorado Delta.

During the afternoon, Mr. Rockwell dismounted to kill a rattlesnake (*Crotalus* (*mitchelli*?)), and at our night camp, near a lonesome desert corral, he posed the reptile and made a plaster mold.

On the morning of March 30, we started early from the dry camp, passing Black Butte on our left before the sun was high. All through the day, I hunted on either side of our line of march, my black horse paying no attention even when I shot right over its ears. Potting jack-rabbits and desert quail from the saddle was good sport, especially as the quail took wing much more freely than I had expected; but the jack-rabbits proved to be infested with the revolting larvæ of a bot-fly (*Cuterebra*), so thereafter we shot no more of them for food. Innumerable caterpillars (*Hemileuca*), of several sizes, covered the floor of the desert. The crops of the quail were crammed with them.

Buzzards, ravens, and egrets were seen as we drew towards Hardy's Colorado. Lizards, too, became numerous, particularly little gray "gridiron-tails" (*Callisaurus*) which scuttled right and left with marvelous swiftness, raising their diminutive arms clear of the ground and taking prodigious strides with their long hind legs.

Just before we reached the site of our noon camp, a male vermilion flycatcher, the most flamboyant sprite among all the birds that cross the southern border of the United States, darted high over a clump of mesquite and poised in the air, singing as if to split his throat, and puffing out his feathers until he looked like a red ball on wings.

While we were preparing lunch under some mesquites on the cracked, sun-baked flood-plain of the river, an old Indian appeared, and looked on without a word. It seemed to be the custom of our westerners to give no recognition to lone Indians, for nobody spoke to him or showed a sign of realizing his presence. He stood statuesquely for half an hour, moving only enough to shift his weight from one foot to the other; but when Mr. Rockwell hauled out a camera, he raised an admonitory hand.

In the middle of the afternoon, while we were approaching a watering place near a spur of the Cocopah range, we saw a troop of horsemen rounding a point half a mile away. They apparently spied us at the same moment, for they immediately deployed, spurred in advance of their pack horses, and cantered towards us. We soon recognized them as a band of Villista rurales, and when they drew up we perceived that the belts of all were bristling with soft-nosed bullets. While we halted our caravan, the Mexicans gathered around us, and each rider rested by sliding part way from his saddle and hanging by the crook of one leg. They had evidently been on a long scouting expedition, for their mounts and pack horses, though good, looked almost worn-out. The leader of the band, a one-eyed old fellow wearing a gray and red uniform, brought up the rear. When he joined our group, a long, pompous consultation, and examination of our papers, ensued. He finally seemed ready to pass us, when one young horseman, clad in blue jeans and carrying around his waist and chest enough rifle cartridges to supply a company, noticed my automatic pistol, which I had neglected to have included in the list of fire-arms named in our permit. The Mexican promptly asked me to empty the magazine and to pass the arm and loose cartridges to the one-eyed chief. The band then rode on toward Mexicali, where they punctiliously turned in the pistol, for I subsequently received it from Colonel Cantù.

We struck camp early beside a lagoon of the Hardy, because Pancho said that there was no herbage for the horses farther along the trail. While I wrote my journal by the light of a candle and the full moon, strange amphibian voices rang out from the sunken marshland, the only other sounds being the bell on our white mare's neck and frequently a sputter from a browsing burro.

Next morning I awoke before dawn, when the golden moon was just sinking behind the western crest of mountains. A very heavy dew had fallen, and the lagoon had risen several inches during the night. Killdeers were piping, nighthawks and bats were darting about, and railbirds skulked stealthily across the wet flats. While I was broiling a cottontail rabbit

over Pancho's early fire, a great file of cormorants passed against the dawn, and many blue herons lumbered up from their roosts in the brakes.

During most of this day we crossed tips of the Cocopahs and the rough, stony gullies between them. In the middle of the forenoon we reached the settlement of Papa Laguna, the grizzled head of a large Indian family which lived in several wicker, mud-plastered houses, surrounded by well-kept tilled patches and dog-proof racks of jerked beef. Prompted by simple courtesy, we made the correct move of shaking hands with old Laguna, and of asking his permission before taking any liberties about his camp. He therefore proved gracious, and after I had shown him a few photographs, he consented to having his own picture taken, as well as those of several of his grandchildren. First, however, he growled to one of the women to find his hat, which apparently he wore only on state occasions.

These Indians call themselves Cocopahs,[1] a name which appears in other spellings on eighteenth century Spanish maps. Together with the Yumas and Cahuillas, they are among the last remnants of the autochthonous peoples of northern Baja California. The Cocopahs dwell all along the delta plains and cultivate considerable strips of the rich alluvial soil, in which they raise corn, barley, potatoes, onions, melons, and other garden truck. Many of the young men act as cowboys for cattle syndicates, and so earn their right to a certain amount of beef. The older men, such as Laguna, obtain some of the commodities of civilization by plume-hunting, disposing of their illicit wares to border smugglers. A few of them own dilapidated shotguns, against the rules of the Mexican officials, but as they can obtain ammunition only with much difficulty, they do most of their rabbit and bird hunting with bows and arrows. Most of the women never leave the wilderness or see white people other than passing rurales. The Indians have no schools or priests. Porfirio Diaz is said to have

[1] MacDougal (1906) gives a highly interesting account of the customs and culture of these agricultural Indians, as well as data on the extraordinary diminution of their numbers during recent times.

FIG. 1.—HORSES AND BURROS DRINKING FROM HARDY'S COLORADO DURING THE PERIOD OF OVERFLOW, MARCH 30, 1915. THE RETICULAR CLEAVAGE OF THE SILT, AND THE "DROWNED" IRONWOOD TREE, ARE CHARACTERISTIC.

FIG. 2.—AN INDIAN HABITATION BETWEEN THE HARDY RIVER AND THE COCOPAH MOUNTAINS. THE WALLS AND ROOF OF THE STRUCTURE ARE MADE OF ARROWWEED. AT THE LEFT, A SUPPLY OF BEEF IS SUSPENDED FROM A LINE TO BE SUN-CURED OR "JERKED".

befriended them by stipulating that no lease of public lands might invalidate their right to keep their dwellings and to earn their sustenance by hunting and agriculture.

For twenty-five cents Mr. Rockwell purchased a formidable-looking bow and several arrows from a middle-aged Cocopah whose skill with the weapons was vouched for by the blood and feathers of a flycatcher (*Myiarchus*) that still clung to one of the arrows. Strangely enough, these Indians would not sell even a small piece of bead work for five American dollars. The only other valuable handicraft that we saw within their shacks were several very large pottery jars, the like of which, according to Captain Funcke, had not been made among them for more than a generation. Laguna produced sixteen egret plumes, which he tried to sell to us, and, judging by the price he asked, he was thoroughly familiar with the demand for these feathers in certain quarters.

After bidding farewell to the Indians, we entered a forest of heavy mesquites, which at this point stretched from the river bank to the base of the mountain range. Presently I saw the leading animal, the mule, step over a large rattlesnake, probably *Crotalus atrox*. The Captain's white mare also passed over without seeing the serpent, which lay silently in coils. My horse was the third in line, but while I was drawing my shotgun from its scabbard, the snake unwound, and darted under the mesquites.

Our burros made no end of trouble by lying down continually, and by running off the trail. We had to keep driving them back, a task, however, to which the horses were thoroughly trained. One of the characteristics of a desert burro is a stolid aversion to wetting its dainty hoofs. It prefers making a detour of half a mile with a heavy pack on its back, rather than to cross an eighteen-inch strip of water jutting across the path. One of our burros was lost altogether, but after an exasperating delay we found it lying comfortably against a rocky wall of the mountain side.[1]

[1] A surprising number of burros, and even horses, escape from the night camps of travellers, or from Imperial Valley ranches, into this southern Colorado Desert, where they lead feral lives indefinitely, unless

At noon we camped where the Hardy ran so close to the granite hills that it left scarcely a beach between. Here the water flowed in a maze of separate streams. Two of us took a swim in one of the swift, muddy, side channels, while the horses and asses crunched and slopped among the succulent tules. Groups of wild ducks were floating down stream, and a flock of white pelicans circled cloud-high over the marshes. Two families of vermilion flycatchers evidently had headquarters close by, for the blazing males sat on the most conspicuous perches over the streams. Desert quail uttered their melancholy yelps from the brush at the base of the mountain, but they clung closely about the sheltering mesquite stalks.

The afternoon's march was hot and hard. When we made camp below Mount Mayor, of the Cocopah Range, men and beasts were thoroughly tired, and the horses, mules, and burros rolled on their backs in the dry mud of the flood-plain as soon as their pack-saddles had been removed.

The night was mild, whereas the two preceding had been cold. After an early start, on April 1, our caravan journeyed between the Hardy and the mountains for about four miles, until we had rounded the southern end of the Cocopahs. Then began a portion of the trip which will always be remembered as an ordeal. We struck out over the flat, plantless flood-plain of the Pattie Basin, a vast bar of alluvium, as level as a table, that stretched from Hardy's Colorado to the Laguna Salada, and from the Cocopahs to a chain of mountains called the Pintos, twenty miles to the southward. In May, when snows thaw in the Rocky Mountains, the Colorado overleaps all bounds, and converts this desert into a great sea, an enlargement of the Laguna Salada. The plain was now stark

they chance to be noosed by the leather lariats of the Indians. On April 14, 1915, several miles northwest of the Cerro Prieto, I saw three wild bay horses, which ran away from me like deer. Later in the same day I encountered a pair of errant burros wandering along affectionately together. Almost at the same moment I happened to flush a jack-rabbit, which accidently ran plump into one of these burros, and it would be hard to decide which was the more startled. The burros stampeded as rapidly as their limited powers of speed would permit, while the rabbit disappeared in seven-league boots.

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FIGS. 1 AND 2.—LAGUNA, AN ELDERLY COCOPAH INDIAN.

dry on the surface, cracked in lines like a coarse, irregular net, and here and there shining white with crystals of alkaline salts. Over vast stretches, the salt formed a brittle, glistening crust, which collapsed rottenly under the horses' feet, letting them through into gluey mire. Most of the time we went afoot, driving our tired animals ahead. The heat was insufferable. One of the burros gave out, so that we had to distribute her pack among the others, already over-burdened. We had endless trouble in keeping them on the right way over the fifteen miles of trackless desert.

In the midst of this terrific heat, the mirage was tantalizingly perfect. All around us, at a distance of perhaps half a mile, seemed cool, blue lakes, gleaming in the sun, stretching away to the foot of the mountains and to the willow-fringed Hardy. Off the northern end of the Pintos, were small dark buttes and clumps of mesquite trees which seemed rocks and islets extending from a promontory into an ocean. Southward, beyond all this vast sea of thirst, rose the bluish heights of La Providencia, the mightiest *picacho* of the sierra of San Pedro Mártir (10,000 ft.), its crest marked with gullies full of snow.[1] In this day's heat it was almost impossible to believe that less than three months before several cattlemen had been frozen to death near the base of that mountain.

Over all this expanse of baked mud we saw no suggestions of life save reddish desert flies (*Tabanus*), dead snails,[2] and a few bird bones, but when we drew near the sand dunes and brush patches of the far side, a lean coyote sneaked out ahead and showed us his heels. When we reached the higher ground, towards the Tinaja[3] foothills, we found the ground strewn

[1] For a fascinating description of this wonderful, uncharted sierra, see the paper by A. W. North (1907).

[2] *Planorbis tumens* Carpenter, a discoidal, air-breathing, fresh-water Limnæid, and *Cerithidea sacrata* Gould, a spiral, brackish-water, amphibious mollusk. It is interesting to find the latter, an estuarine shell, together with a typical fluviatile species. Whether the *Cerithidea* thrives in the Colorado delta through the beneficent effect of tidal bores, or whether it has become widely distributed around the salty inland sinks, I do not know.

[3] A tinaja is an earthen water-jar, and these mountains are so called because of the presence of pot-holes which serve as natural reservoirs for rain-water.

with honey-combed pebbles of red and black volcanic rock. In one place the pebbles had been scraped aside in lines as far as we could see, leaving smooth, fairly distinct trails, perhaps made and used by the Indians long ago.

Near the edge of the sand dunes were several low cairns of the volcanic stones. These, likewise, had no doubt been built by Indians of old to mark the direction of the famous *Tres Pozos*, the only sources of fresh water for many a long and burning mile. Although there were formerly three of these water-holes, as the name implies, two of them have become filled up and nearly obliterated. The remaining well is exceedingly hard to find. For many years, it is said, only a few of the Indians have known its whereabouts. Old Laguna, who has lived within twenty miles of it for most of his days, has never yet seen it. After the development of the Imperial Valley, some ranchmen, who were accustomed to drive cattle northward over this desert, gave a mountain Indian twenty-five dollars to show them the well, for until that time their stock had had to travel forty-eight hours without drinking. Captain Funcke also learned its location from this Indian. He subsequently dug out the well so as to increase the supply of water, and charted its position so accurately by permanent landmarks as to be able to find it with certainty. Lately it has become an important watering place on the route leading southwestward from the Colorado Delta, through the Arroyo Grande, to the Camino de la Sierra, the old mission trail that runs along the roof-ridge of Baja California.

The only other water-holes in the lowlands of Pattie Basin are along the western base of the Cocopah Mountains. Just northwest of the southernmost point of this range, for instance, is the Pozo del Coyote, the water of which becomes poisonous unless it is bailed out often enough to prevent alkaline concentration. Fifteen miles further north, is the unfailing seepage of the Agua de las Mujeres, which lies on the Indian trail leading from Volcano Lake, over the Cocopahs, and across the waste of the central Pattie Basin to the Palomar Canyon, in the peninsular escarpment. MacDougal (1907) says that

the blind route traversing the basin, "a distance of about 30 miles across a desert plain, baking in the vertical rays of a tropical sun," sometimes covered in parts "to a depth of a few inches or a few feet" by the hot, salty sheet of the flood that fills the Laguna Salada, has been crossed even in midsummer by Indians or prospectors, both afoot and on horseback.

The Tres Pozos oasis was our objective for the noon camp. It turned out to be a copse precisely like a thousand others which dotted the plain in all directions. The water-hole was such as African mammals dig in the sand. It was about ten feet across by seven deep, with a slope on one side, and at the bottom stood three feet of seepage water—yellow, opaque, and slimy. Its surface was sprinkled with dead caterpillars, and the edge of the incline was lined with the footprints of coyotes. Our horses and burros guzzled their fill, after which I made an effort and swallowed a mouthful. It tasted like laundry suds, and put me in mind of the water which thirsting Arabs take from a slaughtered camel's stomach. If the coyotes drink this fluid, one might consider shooting them as merely putting them out of their misery. The desert antelopes, and mule-deer, have no such trial, for they drink not at all, unless it be during early summer when the Laguna Salada is highest and freshest.

From the Tres Pozos, our distant hunting ground, which extended into the arroyos of the Tinajas, looked like a green, grassy slope; in reality it was covered with ironwood trees (*Olneya tesota*), mesquite, palo verde (*Cercidium torreyanum*), creosote, smoke-bush (*Parosela spinosa*), huge ocotillas, and many cacti.

After a long rest by the well, we proceeded up the slope to the heart of the antelope country, and made our permanent camp seven miles from water. A quail in a near-by ironwood called its mournfulest all night long; at breakfast time it still sat and yelped in plain view, with its pretty black tassel tipped forward over its bill.

A great portion of the western slopes of Pattie Basin (see map), where we now prepared for a ten-day sojourn, might well be described by the term "arboreal desert" because of the

abundance and luxuriance of the half-dozen species of trees, the ocotilla, larger shrubs, and cacti. The lower, flatter parts of the slope, where the altitude is only slightly greater than that of the Laguna Salada and its flood-plain, are covered with scattering clumps of mesquite similar to the one at the Tres Pozos. Interspersed among the mesquites are patches of an *Atriplex*, probably the quail-brush, *A. lentiformis* (Pl. VI, Fig. 1.), and between the clumps is a sparse growth of bunch-grass. Mesquites are by no means confined to this lower belt, however, for they form rows, sometimes veritable hedges, along the innumerable arroyos that reach for a distance of eight or ten miles up the slope to the abrupt face of the Tinajas. Indeed, the size and vigor of the mesquites in this dry expanse does not conform to the general opinion that the species is unable to flourish on the desert proper. Beyond question, the largest trees that we saw were along the upper washes.

At the southeastern extremity of the basin, near the foot of the Pinto Range and bordering the delta flood-plain, is an extensive dune area where acres of "antelope weed" (*Abronia villosa*) were in blossom at the time of our visit. Southwestward from here, and uphill, this type of terrane is succeeded by stretches in which saltbush (*Atriplex polycarpa*) and creosote prevail, although there are also a number of wind-formed mounds, twelve or fifteen feet high, still covered by the projecting limbs of large, moribund mesquites. At least one such mesquite dune was used as a roosting place by a small flock of ravens, in April, 1915.

Beginning in the sandy area just described, and extending for several miles up the long slope, is a broad belt of creosote bushes in which there is a considerable mingling of gramineous plants and annuals. Pebbly tracts, practically bare of vegetation, are common among the creosotes, and in such places we frequently found horned larks feeding.

Running in more or less parallel lines across the creosote belt, and extending with sporadic interruptions from the face of the Tinajas to the very floor of Pattie Basin, are the long gulches or arroyos previously mentioned. These are usually gouged out to a depth of from two to eight feet below the

general level of the mesa. Their beds are composed mostly of clean, water-borne sand, which is arranged in bars that indicate the agency of either thunder-storms or freshets due to rapidly melting snow. These arroyos are bordered not only by the healthiest of mesquites, as stated above, but also, especially along their higher stretches, by exuberant ironwoods, palo verdes, smokebushes, etc.; while the stony soil between them supports bisnagas (*Echinocactus*), "organ-pipe" cacti, and an extraordinary profusion of early spring flowers. Sometimes an "island" of small trees, from the bases of which wild gourd (*Cucurbita palmata*) vines radiate, will be found in the very middle of a broad arroyo. It is evident that the Wash Association is here much more extensive than the corresponding zone in the lower valley of the Colorado River (cf. Grinnell, 1914, 82–84), doubtless because of the long, gradual slope on the western side of Pattie Basin.

The highest belt of the whole slope, adjoining the bare, rocky incline of the mountains themselves, is characterized by the number and size of the ocotillas (*Fouquieria*); and along the lower edge of this "association," if it deserve such a designation, the genuine upland desert flora, and at least the avian fauna, are to be seen at their best. I am quite convinced that a pleasant surprise is in store for the first botanist to explore this particular region. Is it not suggestive, for instance, that on the slopes three or four miles south of the butte called the Caparote, I found mesquite trees with trunks close to three feet in diameter at the point of branching?

Our attempts to collect pronghorns, an object to which all other activities were subordinated during our stay in Pattie Basin, met with scant success. The best opportunity of all, resulting in a failure, came on the first morning of our hunting. Thereafter, however, we continued hopefully for many days, under exceptionally trying climatic conditions and at all hours except the insufferable noon-day, to range over a country from which the quarry had obviously been nearly cleaned out. The present notes are nothing more than the sum of the natural history observations incidental to each day's work.

On April 2, Captain Funcke, Mr. Rockwell, and I started

hunting by starlight and moonlight, and were off towards the east just as the first faint streak of orange lined the crest of the Pintos. The sun rose red and sparkled on the heights of San Pedro Mártir, and for a brief while the desert was like a garden of cool sweet odors. The perfume came mostly from the lavender antelope-weed (*Abronia*), but was mingled with the delicate scent of a small white primrose, a tall desert "Easter lily," and a score of other flowers, yellow, white, red, and purple. Mockingbirds were singing their best from every mesquite; a pair of croaking ravens circled over us; various lizards, just warming into activity, scuttled hither and thither. I picked up two lizards which had become torpid during the chill night and were lying as if dead. Both were desert-colored and granular above, but on either side of their bellies were stripes of a brilliant hue. The larger lizard (*Uma notata*) had round black spots followed by streaks of red. In the smaller species (*Uta graciosa*) the stripes were longer and of a bright blue color. The significance of such patches on the bellies of lizards has not been discovered, but they are known to vary with species, sex, age, season, and the temperature or light conditions of the immediate surroundings.

We spread out abreast a couple of hundred yards apart, keeping a sharp lookout ahead. The country was fairly open —with ironwood and mesquite along the washes, and groves of creosote bush stretching down towards the basin. In most places we could see around us for three or four hundred yards, sometimes even farther. Walking was difficult, owing to the fields of volcanic pebbles on the mesa, and the soft sand in the arroyos. The heart-shaped tracks of antelopes were visible everywhere, but were mostly old. Finally we came upon the track of a single buck which had apparently passed within a short time, and a few minutes later I spied the animal some distance in advance. I had scarcely time to crouch, before it started off on a lope, and, after we had trailed it about two miles, we gave it up.

Antelopes begin to feed early in the morning, and cover the ground rapidly while they graze; but before the sun is high they almost invariably lie down to rest. If a band is

discovered while feeding, the animals do not always run away at sight. They may instead, if unused to men, stand and watch with curiosity, or they may even come forward to investigate at close range. The last is what happened at our second meeting. I saw a troop of seven or eight bucks and does in the distance, and while we were stalking them, a beautiful buck, taking us perchance for a new kind of prong-horn, came cantering towards us, stiff-legged and proud. He stopped eighty or ninety yards away from Captain Funcke, who, on bended knee, was watching him along the barrel of Pancho's ancient Winchester. To this day the Captain cannot explain how he missed that shot, except by blaming it on the untried rifle.

After this disappointing incident, we wandered on through the oppressive, rapidly increasing heat, our lips caking and turning black from thirst, and our cottony tongues cleaving to the back of our mouths. We had two gallons of water in our three canteens, but it was the horrible slimy stuff from the Tres Pozos. One had not the will power to drink enough of it to quench thirst; indeed it was necessary to think of things far away before swallowing a single gulp.

Before the middle of the forenoon we began to work back towards camp, now and then climbing into large mesquites or ironwoods in order to look over the ground for roving prong-horns. In camp, we lay through the heat of the day almost stripped of clothes, moving round our big mesquite so as to keep in the shade, and seeking further relief by perpetually changing the attitude of our bodies.[1] Desert flies buzzed about us, but this annoyance was not to be compared with the heat and the blinding glare. When the sunbeams had grown slanting, we went hunting again, this time in the direction of the Tinajas, well up into the passes. We found no trace of

[1] 120° F., in the shade, is by no means an unusual temperature in parts of the Colorado Desert. The *average* daily maximum temperature at Calexico, during the month of July, 1906, was 105° F. On August 10, 1913, at Greenland Ranch in the Imperial Valley, the thermometer reached 134° F., the highest shade temperature ever recorded by the United States Weather Bureau. In the San Felipe Desert, Baja California, just south of Pattie Basin, 114° F. has been recorded at seven o'clock in the morning.

antelopes, and returned about dark, after a day of twenty-five miles of the roughest kind of walking, just as the horses arrived from the Tres Pozos with twenty gallons of the vile water, carried in canvas sacks. We drank tea until our stomachs bulged, yet the thirst in our throats remained unappeased.

On the following day we were fortunate in seeing no fewer than nine antelopes, but all of them at very long range. Pancho alone obtained a shot, which served only to make the game still more wary.

On the breathless morning of April 4, we tramped close to twenty miles, partly over exceedingly rough and stony soil. The whole period of seven or eight hours was a gruelling drill, especially as we saw not one pronghorn to encourage us, though for a while we followed the fresh trail of a doe with two fawns, losing the tracks on hard ground, after the trio had evidently started to run. I startled innumerable jack-rabbits, which bounded away, now and again sitting on their haunches to look back at me. When they ran between me and the early sun, a blood-red light glowed through their upright ears. I also flushed a number of the silent night-hawks from their naps beneath mesquite shrubs. Among the creosotes were many large burrows, which, the Captain said, were the diggings of badgers. From time to time we carelessly stumbled into the little homesteads of kangaroo-rats (*Dipodomys* sp.). These tawny, parched, thirst-loving rodents dig good-sized tunnels in low mounds of sandy soil, undermining the surface so that the tired and unwary pedestrian sinks through to the middle of his shins, a disconcerting accident for him, and doubtless also for the rats. Horses schooled in the ways of the desert learn well to avoid such pitfalls.

During the morning, Mr. Rockwell had a narrow escape when he stepped on a horned rattlesnake, or sidewinder (*Crotalus cerastes*), one of two that lay apparently asleep in his path. Probably his foot came down on the snake's head, and at the buzz of the rattle he leaped to safety. We killed the snake and its mate. The latter made short strikes—about a third the length of its body—with lightning rapidity.

While watching us, it kept thrusting its forked tongue alternately up over its snout and down beneath its chin. This was only the first of several experiences with these inconspicuous, backward-gliding reptiles, which were unpleasantly common in the Creosote and Saltbush Associations, especially at the hour of dusk. One evening Mac, the cook, killed a sidewinder in Captain Funcke's bedding just as I rolled up in my own blankets too fagged even to investigate closely for a similar bedfellow. On another occasion I rode my horse into the sand dune region, in the southeastern part of Pattie Basin, to hunt alone. A sidewinder at the base of a buried-mesquite mound was my first customer, and, oddly enough, the horse showed no fear of the reptile rattling ominously under his nose. When I dismounted, the snake struck at me repeatedly while retreating tail foremost, but I killed it with a small stick and deposited it in my saddle-bag. The specimen, before me as I write, is 22 inches long, or of about the maximum size for the species. It has nine rattles and a button, and in its right upper jaw are two full-sized, functional fangs. The left fang is single.

The first antelope, a fawn, was brought into camp at noon of April 4. Pancho, coming from the water-hole with our eleven animals, had killed it with his roundabout rifle while the poor creature lay sleeping, or feigning sleep, among the creosote bushes. The fawn, however, was no more welcome than the bulging water bags, for, until the Mexican arrived, we had had just two cupfuls of the yellow fluid in our possession, and we were seriously considering a seven-mile hike to the Tres Pozos on our weary feet.

Late in the forenoon on this day, dense white clouds gathered over the Peninsula Escarpment, obscuring some of the peaks. The Captain said that they were mists from the Pacific; he prophesied strong westerly winds, which subsequently arose.

On April 6, we moved our field headquarters from the first site to a miserable clump of mesquite on low ground a mile or so northwest of the Tres Pozos. The new neighborhood was far less attractive than the higher land—hotter by day, colder by night—but guayeta grass for the horses was rela-

tively abundant, and we had more ready access to an extensive pronghorn range in the direction of the Caparote. During our second evening here, Captain Funcke returned from the day's hunt with the skins and meat of two antelopes. He had had to blindfold, hobble, and tether his blood-shy mule before he could lash the carcasses upon her back. From sunset until breakfast the coyotes howled and howled all around our encampment. When we answered them from our blankets, they redoubled their outcry.

The season was the height of spring in Pattie Basin. The breeding of the desert birds was just beginning—that is, most of them had commenced to build nests, but few had laid their eggs. Moths were replacing the armies of caterpillars; other common insects were wasps, bees, flies, and four or five abundant beetles. The latter were especially in evidence about dusk. A shiny black Carabid, *Calosoma parvicollis*, was exceedingly predaceous, puncturing the *Hemileuca* caterpillars with its huge horizontal jaws, and devouring the custard within. When disturbed, it fled by running, and, if captured, it exuded a drop of offensive fluid that smelled like ink, only worse. A gray, antique-looking Tenebrionid, *Cryptoglossa verrucosa*, more like an armored fossil than a creature of this age, seemed to be a burrower. It was also a sort of opossum among insects, for it pretended to be dead whenever it was discovered. Still another beetle, a black Meloid, *Phodaga alticeps*, had the habit of raising its elytra straight up over its back, so that they might serve as sails as it scurried before the wind across bare patches of the desert floor. Finally, a fourth beetle, also a Meloid, and known to science as *Cysteodemus armatus*, possessed a round, hunch-backed body, which, since its pitted surface was always covered with white dust, resembled a bag of meal. The most extraordinary point about this insect was that in calm weather one could quite distinctly hear its footfalls on the sand. It used to give me a strange sensation to crouch down among the creosote bushes at the hour of sunset, and *listen to* the beetles scampering about.

To me, twilight always seemed a mysterious hour in the

FIG. 1.—THE COCOPAH RANGE, VIEWED FROM NEAR THE BANK OF NEW RIVER. THE CHARACTERISTIC DETRITAL SLOPES (WASH ASSOCIATION) SHOW DISTINCTLY. THE VEGETATION IN THE FOREGROUND IS MAINLY SALTBUSH (*Atriplex polycarpa*).

FIG. 2.—CROSSING A SPUR OF THE COCOPAHS, MARCH 31, 1915.

open desert. Almost before the afterglow had gone, shooting stars began to streak the clear sky. Ravens, suddenly grown silent, still circled about before settling to roost among the branches of the largest dying mesquites. Jack-rabbits, frightened by my horse, appeared in the changing light to glide prodigiously over the bushes, like pale phantoms. Other eerie creatures that sprang into life at this hour were the nighthawks. By day these birds rest on the ground under creosotes and mesquites, coming forth by thousands at about the same moment just after sundown. The sound produced by their wings, as we often heard it through the night and particularly at early dawn, is an obscure bell-like vibration, as if the very atmosphere were trembling. Its source is difficult to discover; sometimes it seems like a noise within one's ears.

On April 10, I decided that after one more day's work I should start for Calexico, taking Pancho, most of the pack-animals, all the heavy luggage, the cases of specimens, and the least practicable amount of food. Rockwell and the Captain would remain to continue the hunt.

Accordingly, on the morning of April 11, we were up before the narrow crescent of the old moon. The three of us were off early towards the northwest, the Captain's little dun mule setting a pace that kept us spurring. We rode directly into very rough country, near a gap in the Tinajas, evidently frightening a small troop of antelopes on the way, for we found their scampering tracks.

Tethering the mounts in an arroyo where there was good feed, we started toward the Caparote separately, the Captain taking the low-ground route, Rockwell the middle, and I the higher, stony slopes near the base of the mountains. Along my way the vermilion ocotillas were in full bloom, and some of them were giant plants indeed, close to thirty feet tall. The tiny leaves and saffron blossoms of the palo verde were just sprouting. There were also many white hibiscus-like flowers, and two kinds of yellow composites (*Encelia eriocephala* and *Tricoptilum incisum*). Among the stalks and on the golden blossoms of the former species, were

mating pairs of a large and handsome beetle (*Cantharis magister*), related to the "Spanish fly" of Europe, with black elytra and red head, thorax, and legs. Yellowish tassels were just appearing on the twigs of the mesquites. Some of the latter were huge trees, but nearly all seemed half or two-thirds dead from their commensal struggle with the red-berried mistletoe (*Phoradendron californicum*).

If possible, the day seemed thirstier than any other. After hunting in vain for several miles, and nearly emptying my canteen, I had to return to the base for more water from the sack. Larger game failing, I collected doves, phainopeplas, flycatchers, shrikes, cottontail rabbits, and a gopher snake (*Ophibolus getulus* subsp.), and then crawled under a shady mesquite in the arroyo, and ate lunch, which consisted of corn bread and jerked antelope meat. While I ate, a mockingbird sat on the topmost dead bough of a neighboring mesquite, and sang the sweetest song that I had ever heard. The pure ecstasy of his singing must also have carried him off his feet, for every few seconds he would leap joyously into the air, only to dive again to his trembling perch and renew the music. The noon-day mirages were wonderful past expression. At times all the distant mountains seemed to be half engulfed in a sea which reflected their inverted summits, while the flood-plain on the near side of Hardy's Colorado looked so much like water that one could have sworn it such.

The other hunters were no more successful than I. In the afternoon we worked together, but saw nothing to reward our search except some fairly fresh tracks. We reached the Tres Pozos at sunset. Our mounts each drank about fifteen gallons of the alleged water, the horses, in accordance with equine etiquette, preceding the Captain's mule.

Packing the entire outfit on the morning of April 12 took a long time, so that it was half-past seven o'clock when we reached the Tres Pozos. The surface was covered with froth, the result of some sort of fermentation. We watered our animals, and filled our sacks and canteens (for the last time with that fluid, I thought rejoicingly). The Captain gave me Colonel Cantù's permit, and we parted, he and Rockwell up

among the creosote bushes, Pancho and I towards the suffocating flood-plain of the Laguna Salada. We drove our pack-animals hard, allowing the speed to slacken only where the glistening alkaline crust broke through, and the horses' feet sank above the hocks. It was perceptibly hotter than when we had come on the southward journey, but we made good time and reached the first watering place on the Hardy at noon.

Looking back toward the beautiful though inhospitable wilderness of our two weeks' sojourn, I again had the impression of a tremendous grassy lawn, sloping gently from the rugged Tinajas to the level of the flood-plain. Here and there over this region we could see scores of dusty whirlwinds, each sending its thin, pale column up like a church steeple. We had become accustomed to meeting these whirlwinds during our hunting. Sometimes they had seemed to stand in the same place for minutes at a time; sometimes they rushed along at great speed, shaking the bushes in their path, and carrying a swirl of sand and dead leaves in their bases.

While Pancho was preparing lunch, I enjoyed a cool swim in a cove of Hardy's Colorado. We then packed again, making a short noon, and rode along below the jagged mountains. Quail, now all breeding, called from every copse. Bevies of them ran before us, as did also an occasional jack-rabbit and many brush cottontails (*Sylvilagus auduboni arizonæ*). The latter had a peculiarly comical, half-grown appearance.

The Hardy was very much higher than it had been in March. In places we had to make wide detours, while at every bend the muddy river went rushing along at a rate of six or seven miles an hour, with backward-flowing eddies near the banks. During the afternoon we followed for a time an upper trail over a small ridge, from where I could survey the whole delta of the Colorado, clear to the mountains of Sonora many a long mile to the eastward. The arrowweed, willows, and reeds of the river-bottom were as green as the flooding stream could make them. Along a sandy bank beyond the river, I could see the turkey vultures standing in a row with their broad wings spread to the sun, like Roman legionaries

with shields upon their arms. Great blue herons were flying about everywhere, and sometimes they would allow us to ride close to them as they stood among the rushes. After the sun had sunk below the near-by crest, a troop of white pelicans—hundreds of them—soared past us in the glow that came over the hill-top. Despite their size and weight they flew with all the grace and ease of gulls, and far more majestically.

About the time that the nighthawks began to fly, we made camp. While our simple supper was cooking, I walked through the brush to the brink of the river. Strange cackles, whistles, and splashings came from the half-submerged islands and the tules. Coots were playing together in the twilight, and herons, plovers, and unfamiliar songbirds were making the semitropical night resound. The birds were succeeded by still more unfamiliar frogs, which croaked and whistled until after dark. All night we were hot, and mosquitos made us more or less restless.

Next morning we passed for several hours alternately through jungle-like, river-bottom vegetation, and over bare, stony ridges. Wherever the ground was moist there was a riot of flowers. Bordering some of the sloughs were rows of the little, pink-blossomed *Sessuvium sessile*, a plant related to the sea purslane of our eastern salt marshes.

About nine o'clock we crossed the low mountain-pass, leading our steeds by the bridles, and came presently to the habitation of Papa Laguna, who was standing under the porch of his hut doing nothing, as usual. One hand was stretched to the rafters overhead in order to support comfortably his powerful, barrel-chested body. His sons and grandsons, in cow-punchers' garb, were leading horses hither and thither, or standing around waiting for breakfast. One of them was amusing himself by throwing bits of caked earth at a cat. This animal, with some pigeons, chickens, and nine or ten curs of all sizes, was eating under one of the shelters, and in the midst of them a rather fine-looking Indian girl was mixing dough. A number of children, mostly slightly cross-eyed, were also toddling about, while several girls of ten years or

more held young babies in their arms. Some of the children had silver medals of the Virgin strung from their necks.

I watched one woman making griddle-cakes of a kind of fine meal. First she rolled and patted the unleavened dough into balls, then pinched and slapped these into very thin disks, which she cooked on a dry iron plate, turning them over a dozen times, and folding them twice at the end. All of the Indians were either too busy or too dignified to pay the slightest attention to Pancho and me, except to say "*Buenos dias.*" The little girl, whose picture I had taken on the trip down, began to cry about something, and old Laguna at once left his orang-utan position under the rafters, and went to comfort her. He seemed very grandfatherly.

We bought a few potatoes, some sugar, and one large onion from Laguna for the high price of fifty cents, and then went on, passing several little cultivated patches belonging to the Indians. We also met two or three middle-aged men out hunting cottontails with bows and arrows.

At the point of the Cocopahs, where we had met the rurales on our southward trip, the rising river had flooded the whole region, so that we had to force our animals to wade, or else to clamber along the rough mountain-side. The whole enswamped desert was merry with red-winged blackbirds, coots, and killdeers. Many of the last pattered along just a few feet ahead of us, uttering their plaintive calls.

We lunched within sight of the Cerro Prieto, and had scarcely renewed our journey when a strange, wild sound of high-pitched singing came down the trail from the northward. A moment later a large burro, with an Indian boy and girl on its back, trotted into sight. Behind them came another burro with a young man seated far back on its haunches. The three Indians were singing at the tops of their lungs in weird, falsetto voices, and they were dressed as if for a celebration, with red and green cotton cloths bound round their hair, and two red stripes, bordered with narrow lines of yellow, painted across their faces from ear to ear. They barely interrupted their singing to exchange a *buenos dias* as they trotted past, and for a long time the wind brought us snatches of their expressive music.

At the last bend of Hardy's Colorado, with Signal Mountain on the border in full view, we gave our tired animals plenty of time to drink, for the next water would be twenty-four hours beyond.

When we had left the eastern point of the Cocopahs well behind, the wind began to blow strongly from the west, soon increasing to a gale. The sky remained clear, except that a yellow circle of dust-laden air obscured the horizon, and so much fine sand was flying that one had to face to leeward to breathe. Eventually the wind became so strong that the yielding creosote bushes flattened almost against the ground, and I could scarcely sit on my poor horse, who kept his nose turned way from the blast. All the while the sun was shining brightly, and the storm recalled the description of the dry gale off Point Concepcion in "Three Years before the Mast." Finally we camped in as sheltered a spot as could be found. The wind howled until midnight, after which it calmed.

A seven hours' march next morning brought us to the first irrigation ditch, at the edge of civilization. After watering the animals here, we passed once more through the wonderful alfalfa fields, filled with fat cattle and round horses that were in such strong contrast to our jaded brutes. Scaup ducks and coots were resting contentedly on one of the ponds, and another was filled with long-legged, wading stilts, a rare sight in their white and sable plumage. Half a dozen road-runners scurried along the ruts of the highway that led us into Mexicali, which we reached at noon.

On April 23, Mrs. Murphy and I began a second journey into Baja California, taking only a light outfit on two pack-burros. We turned eastward at a point north of the Cerro Prieto, crossed the stagnant sloughs of the New River, the salty waters of which were unfit even for our animals, and spent several days in the vicinity of Volcano Lake. This fluctuating reservoir of river water, with its adjacent mud volcanoes and hot, sulphurous springs, lies on the crest that divides the Salton Basin from the fan of the Colorado Delta. The extraordinary topographic, geologic, and botanic features of the region have been well described by MacDougal (1906, 1914), and Barrows (1900).

FIG. 1.—HEAD OF A MOUNTED PRONGHORN BUCK, SHOT IN PATTIE BASIN IN MARCH, 1917, AND NOW IN THE BROOKLYN MUSEUM. THE CONDITION OF THE PRONGS, WHICH BEND SHARPLY TOWARD THE MID-LINE, AND THE PRESENCE OF A SUPPLEMENTARY PRONG ON THE RIGHT HORN, ARE NOTEWORTHY.

FIG. 2.—THE TRES POZOS WATERHOLE, IN THE SOUTHWESTERN PART OF PATTIE BASIN. THE PHOTOGRAPH WAS TAKEN EARLY IN APRIL, 1915, WHEN THE SURFACE OF THE WATER STOOD ABOUT FIVE FEET BELOW THE LEVEL OF THE SURROUNDING DESERT.

At this late date the swelling river had overflowed a broad margin of the desert, which was consequently covered with fresh, green vegetation, and alive with waterfowl and song-birds. Teal, ibises, coots, avocets, and stilts, in vast numbers, all more or less indifferent toward the presence of human beings, were feeding along every shoreline; cormorants, gulls, and terns were noisy and abundant about Volcano Lake; yellow-headed blackbirds, blue grosbeaks, swallows, and other new arrivals from the tropics, swarmed over the verdure on the flood-plain. Further back from the life-giving Hardy, on the thirsty stretches towards the base of the Cocopahs, the shrivelled herbage gave evidence that the ephemeral desert springtime was fast passing.

On the Lower Californian Pronghorn.

The Lower Californian antelope was described as a distinct subspecies, *Antilocapra americana peninsularis*, by Nelson (1912), who pointed out that the race had closer affinities with the pronghorn of the western United States than with the one inhabiting the Mexican tableland. Phillips (1913) subsequently confirmed the validity of *peninsularis* by citing diagnostic cranial characters. The topotypes came from the middle part of the peninsula, but the describer states that the range of this antelope extends northward "on the gulf side to beyond 32° [north latitude], to the southern end of the Colorado Desert."

Within ten years pronghorn antelopes were abundant in Pattie Basin, but they have now been shot down to a poor remnant, along with the mountain sheep and other mammals that yield meat or trophies. Pronghorns in particular, judging from their history in our western states, seem literally to wither away before the onslaughts of hunters, their exceedingly delicate adjustment to a rather limited environment, and consequent non-adaptability, doubtless contributing much toward their rapid extermination. Nelson predicts a brief and unfortunate future for the Lower Californian race, and, in a territory without game laws, the fulfilment of his prophecy is more likely to be hastened than delayed.

During eleven days in the habitat of *peninsularis*, I saw between fifty and sixty pronghorns, most often singly, but sometimes in groups of two or three. Only once we observed no fewer than eight in one band, two or more of which were bucks; and on another occasion Mr. Rockwell killed a doe that was in company with four other animals. All that we encountered, with one exception, were hopelessly wild—as wary and frightened, indeed, as even such shy ungulates could well be. Moreover, they seemed to absent themselves for days together from large tracts of country through which we had hunted but once or twice. Under such circumstances, our opportunity for coming into close contact with them was very limited. Yet it seems worth while to record such scanty observations as I was able to make, together with brief data gleaned from the experience of Captain Funcke, who, in 1912, collected the type specimen of the peninsular subspecies.

A fact of particular interest with regard to the Lower Californian pronghorn is that the season of the birth of its young seems to be three or four months earlier than the normal period for antelopes along the Mexican border of the United States. During our hunting in Pattie Basin, April 1–12, 1915, we frequently observed the tracks of does and fawns together. On April 4, our Mexican horse wrangler shot a fawn which he found sleeping among the creosote bushes. Three days later Captain Funcke collected two others of approximately the same size as the first.

The three fawns were very nearly half-grown. It was evident that they had all been weaned, for their stomachs were filled with finely-chopped, bright green, fleshy leaves, the whole mass being in a thick fluid state. I examined this pabulum carefully, and found only fragments of succulent leaves, with no trace of grass.

The first fawn was a male; the second two, which may have been twin sisters, were females. All three were just under a meter long, from nose to base of tail. The skull of the largest fawn was 185 mm. in extreme length, and 92 mm. in breadth across the orbits. The horn knobs of each animal

were barely perceptible to the touch, but the little hillocks of bone were quite distinct on the skulls. The pelage was dense, and attained a length of 38 mm. on the flanks, but there was no suggestion of underfur.

Captain Funcke felt quite certain that our three fawns had been born not later than the middle of February, which he said was the normal time of year for the Lower Californian subspecies. If one were to judge by analogy with the fawns of white-tailed deer, the young antelopes would have been called at least three months of age. Now throughout the western United States, and wherever antelopes occur along the Mexican border, June is the month in which most of the young are born. Only rarely are the fawns known to have come into the world as early as May, although the birth season may be greatly extended at its later end. Mearns (1907), for instance, once observed near the Mexican line a doe antelope with two small fawns on September 23, and he took both large and small fetuses from females killed in June.

Owing to the size and probable age of our fawns, the circumstances under which they were taken, and the corroborative evidence of such hoof-prints as we saw, there can be little doubt that they were still in the care of their mothers, and that they had been merely temporarily left to themselves. The doe antelope's custom of leaving her fawns in hiding, usually at some little distance from one another, while she forages for herself, is well known. Hofer (1899) describes with what watchfulness and subtlety a doe returns to the place where her young are patiently awaiting her, concealed rather by their own quietness than by any cover. He states that the fawns go down on their knees, like lambs, to suckle, and that if the family becomes alarmed while the youngsters are nursing or playing, they "drop, as if shot, never stopping to fold a leg under them, but flattening themselves on the ground." It was in just such a "frozen" posture that our Mexican found the first victim.

In February, according to Captain Funcke, the Lower Californian antelope does are harried continually by the pestiferously abundant coyotes, which eat the afterbirth and

try to steal the young fawns. The tactics of a doe in defending her family from a dog are sympathetically described by Hofer, but no doubt an antelope mother would put up a more desperate fight against coyotes alone than against a dog in the presence of its human master.

The ecologic significance of a birth season four months earlier at the southern end of the Colorado Desert than along various parts of the Mexican border is still to be divined. Doubtless, however, it has a close relation to the growing season of the annual plants, and is secondarily connected with the extraordinarily hot, dry summer climate of the northern Lower Californian deserts. The difference in the time of this most important of all functions must, of course, affect the antelope's whole life history. It must relegate the rutting period to early summer, instead of September or October as in the western United States; furthermore, it might be expected to have an effect upon the season of the molt and the dropping of the horns.

Little specific information appears to have been published regarding the food plants of the pronghorn antelope. Caton (1877) writes that the wild herds live on "buffalo grass," and that captive specimens in his deer-park grazed freely upon standing blue grass, and also ate hay. Hornaday (1908) found the antelopes in the Pinacate section of Sonora cropping a species of desert plantain (*Plantago*) that grew in the lava fields. The Lower Californian animals undoubtedly subsist throughout most of the year upon various kinds of sun-cured vegetation, but during the brief spring season of verdure they seem to prefer tender leafage. Although desert bunch-grass, called by the Mexicans "guayeta," was common in scattered patches on the lower slopes of Pattie Basin, I looked in vain for evidence that the antelopes had fed upon it. Captain Funcke maintained that they ate no grass at any season of the year. The foliage of the trailing, lavender-flowered "four o'clock," *Abronia villosa*, which grew in sandy parts of the Creosote Association, was a favorite forage. Another plant that they crushed and mouthed, apparently for the moisture it contained, was the desert broom-rape, *Orobanche multiflora*,

a parasite on the roots of other species. We found many of its flowering heads, uprooted and chewed, in the wake of browsing antelopes. Captain Funcke informed me that he had also seen the animals eating leaves of the ironwood (*Olneya tesota*).

During feeding hours the adult pronghorns lie down to rest a dozen times a day, always starkly in the open, ten or twenty yards from cover, doubtless from fear of the pumas (*Felis improcera*) which sometimes prowl down from the hills. At noon of the hottest days we found the antelope's fresh beds in the most unshaded situations. Captain Funcke said that through the night, too, they slumber only in exposed places, and by daybreak they begin to browse. Usually we were able to distinguish fresh tracks from those several hours old by the moistness of the droppings, which would be found at rather frequent intervals in depressions that the antelopes had scratched in the soil.

Although pronghorns are known to be able to drink bitter alkaline water, and are said to repair periodically to regular watering places, there can be little doubt that those of the Pattie Basin do not drink at all during the greater part of the year. Nelson (1911) states specifically that the Lower Californian deer are mainly xerophilous, and he infers the same of the antelopes. On the southwestern slopes of Pattie Basin there is certainly no water between the mountain tinajas and the Tres Pozos, and the tracks of antelopes have never been observed to lead to either source. Captain Funcke told me, however, that in mid-summer, when the vegetation is parched and the Laguna Salada has been filled from distant Rocky Mountain snow fields, small bands of them occasionally go down to the shores of the flooded plain.

Since the above was set in type, Captain Funcke has sent eight adult Lower Californian pronghorns—six bucks and two does—to the Brooklyn Museum. These were all killed on the western side of Pattie Basin between March 16 and March 25, 1917. All were shedding the hair when killed, although one buck and one doe had only just begun. The others have

more or less extensive patches of the short summer pelage. The molting period of *peninsularis*, therefore, nearly or quite coincides with that of *mexicana* (cf. Mearns, 1907, 224).

Captain Funcke took the following measurements of these specimens immediately after killing them.

Measurements in inches of eight pronghorns.

	1 ♀	2 ♀	3 ♂	4 ♂	5 ♂	6 ♂	7 ♂	8 ♂
Nose to base of tail along back.	50	53	48	54	53	48	47	49
Circumference of throat.....	13½	14	14	17	16	14	13½	15
Circumference base of neck....	18½	20	21	24	23	21	22	22½
Circumference upper fore leg...	8½	9	9	10	9	9	8½	9
Circumference of chest.....	33½	37	34	38	36½	35	34	35
Circumference at belly.....	37	39	37	39	38	37	36	38
Circumference upper hind leg..	13	13½	14	15	15	15	14	14½

Neither female has horns, and among the six male animals there is not a single normal pair. Five of the bucks have horns which lack true prongs, and which are short, much thickened, and covered with clumsy excrescenses resembling rudimentary tines. In the sixth the horns are of the usual form excepting that the prongs are bent sharply inward and that the right horn bears a small supplementary prong 61 mm. above the first. The curve and twist of the two horns are, moreover, asymmetrical. These characters show in the accompanying illustration. The dimensions in millimeters of this pair of horns are as follows.

	R	*L*
Length of horns around curve.....	295	297
Straight line, tips to base.....	166	196
Girth of horns at base.....	147	149
Base to superior base of prong.....	133	140
Width of prong.....	46	50
Spread of horns at tips.....	151	
Spread at widest part.....	248	

Annotated List of the Birds.

In the following list, the records of Stone and Rhoads (1905) have been incorporated with my own observations. It should be noted that Rhoads's expedition was made in February, 1905, before the Colorado River had been diverted from its old bed at the eastern margin of the delta, and at about the

FIG. 1.—NOONDAY CAMP AT THE TRES POZOS OASIS, APRIL 1, 1915. THE TREES ARE HALF DEAD MESQUITES, BEARING MASSES OF MISTLETOE. THE LOW VEGETATION IN THE FOREGOUND IS PROBABLY *Atriplex lentiformis*.

FIG. 2.—A LARGE AND LUXURIANT MESQUITE OF THE UPPER WASH ASSOCIATION, APPROXIMATELY SEVEN MILES SOUTHWEST OF THE TRES POZOS. SUCH TREES ARE CHARACTERISTIC OF PRACTICALLY THE WHOLE DETRITAL OUTWASH EAST OF THE TINAJA MOUNTAINS.

time of the beginning of the flooding of the Salton Basin. The meteorological conditions that prevailed during his visit were of almost unprecedented rainfall and cold, with "ice in the coffee-pot" on February 13.

The writer's observations were made on the last three days of March and throughout the month of April, 1915. Weather conditions were normal, with only one slight shower of rain late in April.

The combined list of birds is, of course, fragmentary, and based upon insufficient collecting; yet it is undoubtedly worth publishing since it includes names of between thirty-five and forty species not observed by Grinnell during his exhaustive field work in the lower Colorado Valley, February 14 to May 15, 1910. The list is presented with the hope of early revision and extension.

1. **Podilymbus podiceps.** Pied-billed Grebe.—Observed several times on Hardy's Colorado in April. Rhoads collected one specimen at the mouth of the river on February 11.
2. **Larus occidentalis.** Western Gull.—"Very abundant on the Colorado and its tributaries" (Rhoads).
3. **Larus argentatus.** Herring Gull.—A few observed on both the Colorado and the Hardy by Rhoads.
4. **Larus californicus.** California Gull.—Observed by Rhoads.
5. **Larus heermanni.** Heermann's Gull.—Observed by Rhoads as far up the Colorado as Yuma.
6. **Larus philadelphia.** Bonaparte's Gull.—One adult, black-headed bird was seen at Volcano Lake, April 25. Two examples in a half-starved condition were collected by Rhoads in February.
7. **Sterna caspia.** Caspian Tern.—Several seen at Volcano Lake, April 25.
8. **Sterna elegans.** Elegant Tern.—Rhoads writes, "A few terns were seen in pairs on all the waters visited, either *S. elegans* or *S. dougalli* or both." The former species is common in the Gulf of California, while *dougalli* is an Atlantic coast tern, and the possibility of its occurrence in the delta need hardly be considered.

9. **Sterna antillarum.** Least Tern.—"Three or four very small terns were probably this species" (Rhoads).
10. **Phalacrocorax auritus albociliatus.** Farallon Cormorant.

Phalacrocorax mexicanus Stone and Rhoads, 687.

Abundant throughout the delta, flocks being observed daily along the Hardy and at Volcano Lake. The specific and subspecific status of the inland cormorant of this region has been settled by the collections of numerous ornithologists.

11. **Pelecanus erythrorhynchos.** White Pelican.—Common in the delta. We frequently observed large flocks, and Rhoads records groups of "half a thousand" feeding with the cormorants.
12. **Mergus americanus.** Merganser.—A few seen by Rhoads.
13. **Mergus serrator.** Red-breasted Merganser.—"Many" (Rhoads).
14. **Anas platyrhynchos.** Mallard.—"Abundant" (Rhoads).
15. **Mareca americana.** Baldpate.—On March 29, a large flock of Baldpates was seen feeding on a pond in an alfalfa field, six miles south of Mexicali.
16. **Nettion carolinense.** Green-winged Teal.—Several flocks observed by Rhoads. The Green-winged Teal is said to be one of the most abundant wintering species in the Imperial Valley, and large numbers of them, with other ducks, are shot on the Mexican side of the line to supply the market. There are no game-protective laws in Baja California, and pot-hunting is further encouraged by planters whose fields lie in Mexican territory. The result is that an extensive slaughter of ducks occurs all winter, the birds being admitted through the United States customs. Captain Funcke informed me that he had himself shot ducks and geese in Mexicali for the Los Angeles wholesalers, and that he had sometimes killed as many as sixty birds from the massed flocks with the five shells in his automatic gun.

17. **Querquedula cyanoptera.** Cinnamon Teal.—Several seen feeding among the grasses along the overflow of the Hardy, near Volcano Lake, on April 26.
18. **Spatula clypeata.** Shoveler.—"Several" (Rhoads).
19. **Dafila acuta.** Pintail.—Several of both sexes observed in the alfalfa fields south of Mexicali, March 29. Also seen by Rhoads in February.
20. **Marila americana.** Redhead.—Observed sparingly in the irrigation ponds south of Mexicali up to the end of April. I photographed a pair on April 15, the birds being not at all shy.
21. **Marila affinis.** Lesser Scaup Duck.—Observed on the ponds south of Mexicali, where one specimen, a female, was collected on March 29.
22. **Erismatura jamaicensis.** Ruddy Duck.—Recorded without comment by Stone and Rhoads.
23. **Chen hyperboreus hyperboreus.** Snow Goose.—Rhoads saw great flocks going northward over the southern Cocopahs, and also near the mouth of the Hardy.
24. **Branta canadensis** subsp.—"A form of this species was continually going toward the coast from the delta, mostly at great elevations" (Rhoads).
25. **Plegadis guarauna.** White-faced Glossy Ibis.—A dozen or more were observed feeding along the overflow of the Hardy, near Volcano Lake, on April 26.
26. **Mycteria americana.** Wood Ibis.
    Tantalus loculator? Stone and Rhoads, 688.
    "A few seen" (Rhoads).
27. **Ixobrychus exilis.** Least Bittern.—One seen along the overflow of the Hardy, April 26.
28. **Ardea herodias herodias.** Great Blue Heron.—Common all along the Hardy; observed many times during both the southward and the return trip.
29. **Herodias egretta.** Egret.—First seen when we reached the Hardy, on March 30. A month later I encountered many more, once in company with the following species, in the marshes south of Volcano

Lake. On April 26, Mrs. Murphy and I met a Cocopah Indian, armed with a rickety old shotgun, who was stalking these herons for their plumes.

30. **Egretta candidissima candidissima.** Snowy Egret.—One seen flying over the delta on April 1, and others near Volcano Lake late in the month. They were exceedingly shy, but on April 26 I managed to approach within two hundred feet of one as it fed in a lagoon.

There are no laws to protect the white herons of Baja California, but, when granting us permission to enter the country, Colonel Cantù, the Military Commandant, requested us not to molest any of these birds.

A certain amount of hunting for the nuptial plumes of both species of egret goes on every spring in the heart of the delta. Old Laguna, the Indian mentioned in my narrative, had a small bundle of the exquisite feathers which he tried to sell to Captain Funcke. Much of this contraband is smuggled across the international boundary from Mexicali, and more from Tia Juana, near San Diego. As authority for this statement, I have the word of a man who has more than once accomplished the act. In Calexico I heard the boast that "every woman in town" possessed a bunch of "aigrettes," all of which had, of course, been brought into the country illicitly. These facts tend to prove that, in the suppression of the plume trade, the creation of a strong public sentiment is quite as important as a rigid enforcement of the law.

31. **Butorides virescens anthonyi.** Anthony's Green Heron.—Common all along Hardy's Colorado in April. Not observed by Rhoads in February.

32. **Nycticorax nycticorax nævius.** Black-crowned Night Heron.—"Without exception the most abundant water bird on the river" (Rhoads). Strangely enough, I saw this heron only along the irrigation canals south of Mexicali, during the latter part of April.

33. **Nyctanassa violacea?** Yellow-crowned Night Heron.—Some of the night herons seen by Rhoads "appeared to belong to the yellow-crowned species." The delta region is, however, far north of the known winter range of *violacea*.

34. **Grus mexicana.** Sandhill Crane.—"Abundant" (Rhoads). This species is at best a winter resident, and was not observed by the writer in April. According to Grinnell (1914, 120), moreover, the migrant cranes of the Colorado Valley are more likely to be *Grus canadensis* than *Grus mexicana*.

35. **Porzana carolina.** Sora.—Several were seen on the flats of Hardy's Colorado, where I collected a single female on the evening of March 30.

36. **Fulica americana.** Coot.—Exceedingly abundant on all waterways—the Hardy River and its sloughs, the edges of Volcano Lake, and the irrigation ditches and ponds. It seems strange that the Coot does not appear in Rhoads's list.

37. **Steganopus tricolor.** Wilson's Phalarope.—At a distance of only a few feet, I watched a Wilson's Phalarope in an irrigation pond on the United States-Mexico border, on April 14. The lone Phalarope was in company with a large flock of Black-necked Stilts.

38. **Recurvirostra americana.** Avocet.—Common at Volcano Lake, and along the overflow of the Hardy, on April 25 and 26. Not observed by Rhoads in February.

39. **Himantopus mexicanus.** Black-necked Stilt.—A flock of about thirty adults and three downy young was seen in a pond on the border, at Mexicali, on April 14. The young birds were evidently newly-hatched, and were swimming among their long-legged, wading elders. This observation constitutes perhaps the earliest breeding record for the species.

We found Black-necked Stilts abundant along the flooding Hardy during the latter part of April.

40. **Pisobia minutilla.** Least Sandpiper.—Several small flocks seen about irrigation ponds south of Mexicali, where specimens were shot on March 29. They were still in winter plumage. This species was also observed by Rhoads.
41. **Catoptrophorus semipalmatus inornatus.** Western Willet.—One, "the only one noted," was collected by Rhoads at the mouth of the Hardy.
42. **Actitis macularia.** Spotted Sandpiper.—Common along the Hardy and at Volcano Lake.
43. **Numenius hudsonicus.** Hudsonian Curlew.—Two flocks seen by Rhoads on the Hardy.
44. **Oxyechus vociferus.** Killdeer.—Very abundant, not only along the river, but also in the cultivated fields on the Mexican side of the boundary line, where they seemed to be breeding. A male was collected on March 30.
45. **Lophortyx gambeli.** Desert Quail.—A plentiful bird throughout the entire region, occurring most abundantly in the densely grown strips along the river, but being common also in the creosote patches of the open desert, and still more so in the higher parts of the Wash Association on the western slopes of Pattie Basin.

    Fourteen specimens of the Desert Quail were preserved. All were in breeding condition, as evidenced by the gonads, and several of the females had large bare patches on the belly. The crops of the specimens taken early in April were mostly crammed with caterpillars of the genus *Hemileuca*, assorted sizes of which were at that time marching in legions across the desert. Later in the month the birds were found to have fed chiefly upon seeds of some sort. Rhoads noted that the berries of the mistletoe furnished them with a staple food supply in winter, and Grinnell (1914) found the new foliage of the mesquite, as well as mistletoe berries, in their stomachs.

    One statement by Grinnell (*op. cit.*, 122), namely

that these birds "apparently need to drink both morning and evening," is impossible for me to believe. Our first camp in the antelope country southwest of Pattie Basin, April 1–6, was upwards of twenty miles from the river, seven miles from the miserable hole of the Tres Pozos, ten miles from the Laguna Salada, and an equal distance from the nearest mountain "tinaja." The soil was everywhere sandy and porous; not a suggestion of moisture was to be detected even in the beds of the deepest barrancas. Yet Desert Quail were abundant at all hours about our camp, and male birds sat on selected perches in the big mesquite and ironwood trees, and yelped by the hour, not only morning and evening, but often *all night long* as well. A secret source of water in that country is almost as much out of the question as a periodical excursion of fourteen miles to and from the Tres Pozos. I think it exceedingly likely that the quail in such remote parts of the desert obtained their moisture in the form of dew or of young and succulent leaves.

The birds are commonly reported to sleep on the ground after the manner of our eastern Bob-white. In the bottom-land at the base of the Borrego Peak of the Cocopahs, however, I found Desert Quail roosting all night in the upper branches of large ironwood trees.

46. **Zenaidura macroura marginella.** Western Mourning Dove.—Not uncommon, especially among the creosotes and scattered mesquites along the cut of the New River. They were usually seen in pairs, and those collected were all breeding birds. A male, whose crop was filled with mistletoe berries, was shot on April 7 at the base of the Tinaja Mountains, southwest of Pattie Basin.

47. **Scardafella inca.** Inca Dove.—A few were seen by Rhoads in the upper Hardy River region.

48. **Gymnogyps californianus.** California Condor.—One was seen by Rhoads from his camp on Mount Mayor, Cocopah Mountains.

49. **Cathartes aura septentrionalis.** Turkey Vulture.—Common. Our attention was frequently attracted to them by the rushing sound of their wings as they swooped through the still desert air. The exposed sandbars of the delta seemed to be favorite resting places, bands of the birds standing in rows and sunning themselves in such situations.

    On April 13, Mr. Rockwell wounded an antelope doe which escaped over rocky ground, leaving no trail either of hoof mark or blood. On the following day he discovered the body of the animal, but the Turkey Vultures had destroyed it.

50. **Elanus leucurus.** White-tailed Kite.—Seen twice along the Hardy by Rhoads.

51. **Circus hudsonius.** Marsh Hawk.—"Frequent" (Rhoads).

52. **Accipiter velox.** Sharp-shinned Hawk.—"Rarely seen" by Rhoads, who shot one specimen on the Colorado River.

53. **Accipiter cooperi.** Cooper's Hawk.—"Several noted" (Rhoads). This species breeds in the timbered bottomlands of the Colorado Valley (*cf.* Grinnell, 124).

54. **Parabuteo unicinctus harrisi.** Harris's Hawk.—Noted several times on the western slopes of Pattie Basin, usually seated upon some low perch. On April 8 I rode my horse within a few yards of one as it sat unconcernedly on a creosote bush not more than three feet above the ground.

    Rhoads found this hawk numerous.

55. **Buteo borealis calurus.** Western Red-tail.—"Abundant" (Rhoads).

56. **Buteo lineatus elegans.** Red-bellied Hawk.—"Several" (Rhoads).

57. **Buteo swainsoni.** Swainson's Hawk.—"Several" (Rhoads).

58. **Buteo platypterus.** Broad-winged Hawk.—"Two or three seen" (Rhoads).

59. **Aquila chrysaëtos.** Golden Eagle.—"At Mount Major" (Rhoads).

60. **Haliæetus leucocephalus leucocephalus.** Bald Eagle.—"One seen twice, or else two individuals, on the upper Hardy River. Stated to be very rare by our Indian guide" (Rhoads).

61. **Falco sparverius phalæna.** Desert Sparrow Hawk.—Seen but once—on the western slopes of Pattie Basin, April 9.

Rhoads obtained specimens along the Hardy.

62. **Polyborus cheriway.** Audubon's Caracara.—"Only two seen on the upper Hardy" (Rhoads).

63. **Pandion haliaëtus carolinensis.** Osprey.—"Seen only at Mount Major" (Rhoads).

64. **Aluco pratincola.** Barn Owl.—"One seen above the Colony" (Rhoads).

The "Colony" is a locality on the eastern side of the delta, the most southerly point at which the old, now abandoned bed of the Colorado River cuts the Sonoran Mesa.

65. **Asio flammeus.** Short-eared Owl.—"A few seen near the mouth of the Hardy" (Rhoads).

66. **Otus asio cineraceus.** Mexican Screech Owl.—"Heard several times" (Rhoads).

67. **Bubo virginianus pallescens.** Western Horned Owl.—Rhoads found this species abundant, and nesting at the time of his visit. Two specimens were collected.

68. **Speotyto cunicularia hypogæa.** Burrowing Owl.—Not uncommon along the dry cuts of the New River, south of Mexicali, and in the creosote and mesquite tracts between the boundary line and the Cerro Prieto (Black Butte). I rode my horse almost over two or three as they stood on the ground watching me. One was seen perching on the top of a dead mesquite on the afternoon of March 29, and I shot a breeding male in flight at noon of April 19.

We saw no trace of Burrowing Owls between Hardy's Colorado and the Cocopahs, or in Pattie Basin. The species was not observed by Rhoads.

69. **Geococcyx californianus.** Roadrunner.—Noted now and again along the Hardy River, but more frequently about the edges of the cultivated country in the Mexican portion of the Imperial Valley. I often saw the Roadrunners travelling along the ramparts of the irrigation canals. A breeding female was collected near Laguna's camp on March 31, and a male on the outskirts of Mexicali, April 19.

70. **Ceryle alcyon.** Belted Kingfisher.—One seen at Volcano Lake, April 25. Rhoads saw the species frequently in the delta.

71. **Dryobates scalaris lucasanus.** San Lucas Woodpecker.—A black and white woodpecker observed several times along the eastern base of the Cocopahs was doubtless the San Lucas Woodpecker, for Stone identified Rhoads's four specimens as this subspecies.

72. **Centurus uropygialis.** Gila Woodpecker.—Frequently seen between the Hardy and the Cocopahs. Rhoads collected specimens which had been feeding on mistletoe berries.

73. **Phalænoptilus nuttalli** subsp.—Two large Caprimulgids seen just before dusk near our first night camp in the Cahuilla Basin, March 29, were presumably some form of Poor-will.

74. **Chordeiles acutipennis texensis.** Texas Nighthawk.—My two skins, both breeding males, were collected on the western slopes of Pattie Basin on April 6 and 12 respectively. In measurements the specimens are somewhat intermediate between *texensis* and the more southerly form *inferior*. Indeed, I believe that knowledge of the locality in which the birds were taken would be necessary to the systematist who might hope to relegate them to their proper subspecies.

Nighthawks were abundant throughout the entire region visited, resting by day under the creosote bushes, and coming forth by the thousand at about the same moment just after sunset A curious point that I noted about their flight was that the birds often

glided with their wings pointed *downward* at a sharp angle. In the narrative I have recorded my impression of their booming.

Rhoads saw only two or three Nighthawks in February, 1905, when the majority of the birds may have been in a more southern latitude. They arrive in the Imperial Valley each spring about the middle of March.

75. **Calypte costæ.** Costa's Hummingbird.—One of these hummers was observed poising before a white lily near the Tres Pozos, on April 9. Rhoads collected two at Mount Mayor, and wrote, "These tiny birds were breeding, one of the specimens shot showing bodily marks of protracted incubation on the 21st of February."

76. **Selasphorus rufus.** Rufous Hummingbird.—One collected in the Cocopahs by Rhoads. He writes, "This bird was going through its aerial love antics in February with all the energy of a midsummer madness. This was the more remarkable as all other bird and animal life was in its deepest winter lethargy during my entire stay at this camp, and the temperature frequently fell to near 45°."

77. **Tyrannus verticalis.** Arkansas Kingbird.—One specimen, a breeding male, taken near the Hardy on April 1. Observed only in the bottom-land along the river.

78. **Myiarchus cinerascens cinerascens.** Ash-throated Flycatcher.—Observed occasionally all along our route, but particularly common in the Wash Association on the western slopes of Pattie Basin. Here, in a locality at least ten miles from water, the Ash-throated Flycatchers were conspicuous in the mesquite and ironwood trees that margined the arroyos. Three breeding males were shot here on April 7, and a female was taken at the edge of the desert south of Mexicali on April 19.

All four specimens are smaller in the dimensions of wing and tail than the mean of a series of twenty-five

from the Colorado Valley above Yuma. For instance, the minimum measurements among fourteen male Colorado Valley birds are, wing 98 mm., tail 92 (Grinnell, *op. cit.*, 148). The *averaged* measurements of my three males are, wing 97.5, tail 86.7.

79. **Sayornis sayus.** Say's Phœbe.—Frequently observed by Rhoads on bluffs above the bottom-land. He collected two specimens.

80. **Sayornis nigricans.** Black Phœbe.—Collected by Rhoads at the mouth of the Hardy and elsewhere in the delta. He writes, "One of the most lively bits of bird life, which relieved the tedium of our boat journey, was the frequent sight of these birds sitting on the floating drift and hawking flies and other insects from the steaming surface of Colorado of a chilly morning."

81. **Myiochanes richardsoni richardsoni.** Western Wood Pewee.—One seen in a grove of eucalyptus trees, in the cultivated country south of Mexicali, on April 17.

82. **Pyrocephalus rubinus mexicanus.** Vermilion Flycatcher.—Seen about six times in April, always on overflow land along the Hardy River. A favorite perch for the males was on dead limbs overhanging the stream. One in brilliant red plumage, but with a white chin, was taken on March 30.

Rhoads collected several, and entered the following account in his journal: "We were sure to find one or more pairs of these in the mesquite groves. They seem to continue their conjugal attachments all winter, some pairs being inseparable. They furnished the only strong bit of color to be seen in the wintry landscape of the Colorado delta in February. The males on warm days were performing their whimsical little flight songs and tumbling feats, but there was no other sign or suggestion that this had anything to do with sexual excitement."

83. **Otocoris alpestris pallida.** Sonora Horned Lark.—Larks, presumably of this form, were first observed

along the eastern flanks of the Cocopah Mountains on April 1. Later, in the creosote tracts on the southwestern slopes of Pattie Basin, I frequently encountered small flocks feeding on the more or less bare pebbly patches. Invariably I was armed only with a rifle on such occasions, and so I obtained no specimens.

Otocoris alpestris pallida has been taken at Calexico, in the Imperial Valley, in winter (Van Rossem, 1913, 132).

84. **Corvus corax sinuatus.** Raven.—This species was obtained at the mouth of the Hardy by Rhoads. He, as well as I, suspected the presence of *C. cryptoleucus*, which might be expected to breed in these Lower Sonoran deserts, but there are no specimens to establish the fact.

Ravens were fairly common in April all along the Hardy, and also in the "arboreal desert" west of the Pattie Basin, where they breed. We found a half-completed nest on April 3, in an ironwood tree. On the evening of April 7, I saw nearly a dozen of the birds come to roost together in a compact clump of half-dead mesquites growing on a huge mound.

Rhoads's note on the Ravens is worth quoting: "While at Cocopah Major I was entertained by the love antics and really wonderful medley of sounds which a love-sick raven is able to make. Some of these are truly melodious modulations of the so-called 'croak,' and run through quite a slice of the gamut. In addition to this they can tumble, twist, dive, soar and sport about the fleeting form of their mate with all the abandon and daring of less sedate and more elegant masters of the air."

85. **Corvus** sp.—Rhoads observed crows, probably *Corvus brachyrhynchos hesperis*.

86. **Molothrus ater obscurus.** Dwarf Cowbird.—Frequently observed. Collected by Rhoads in the delta, and by the writer on the western slopes of Pattie

Basin. A male specimen was accidentally destroyed, but a breeding female, taken on April 12, has a culmen of only 13 mm., or 1 mm. shorter than the minimum among twenty-two females from the lower Colorado Valley (Grinnell, *op. cit.*, 160).

87. **Xanthocephalus xanthocephalus.** YELLOW-HEADED BLACKBIRD.—First observed on my second trip to the Hardy River, where, on April 26, great flocks of Yellow-headed Blackbirds, associated with Red-wings, filled the vegetation above the newly flooded country near Volcano Lake.

88. **Agelaius phœniceus sonoriensis.** SONORA RED-WING.—Flocks of Red-winged Blackbirds were common along the Hardy during the latter part of April. I collected none, but Stone has identified Rhoads's specimens as this form, after comparing them with skins of *A. p. neutralis*. Grinnell's birds from the Colorado Valley are likewise referable to *sonoriensis*.

Neither this bird nor the preceding species was seen in the Pattie Basin, or at any other point away from the bottom-land of the river.

89. **Sturnella neglecta.** WESTERN MEADOWLARK.—Seen only in the cultivated country in the Mexican portion of the Imperial Valley, where they were very abundant and in full song. Rhoads obtained several specimens at the mouth of the Hardy, but writes, "A rare bird except in open savannas along the Hardy River at two or three points."

90. **Icterus cucullatus nelsoni.** ARIZONA HOODED ORIOLE.—Observed sparingly in the Wash Association on the western slopes of Pattie Basin, particularly in the vicinity of the butte called the Caparote. At least six males were seen here on April 12.

91. **Euphagus cyanocephalus.** BREWER'S BLACKBIRD.—"Always abundant near human habitations" (Rhoads).

92. **Carpodacus mexicanus frontalis.** CALIFORNIA LINNET.—Rhoads observed small flocks in the foothills, and collected three on Cocopah Mayor.

93. **Astragalinus lawrencei.** LAWRENCE'S GOLDFINCH.—Rhoads collected specimens in the Cocopahs, and I am almost certain that I saw a number in dense mesquite thickets near the Hardy, on March 30. The species is probably only a winter visitant in the southern Colorado Desert.

94. **Passerculus sandwichensis alaudinus.** WESTERN SAVANNAH SPARROW.—Rhoads collected specimens in the delta. "This species, with flocks of Brewer's and Chipping Sparrows and Abert's Towhee, were in great numbers in some favorable mesquite bottoms where grass, weeds and mistletoe berries formed an abundant harvest."

95. **Passerculus rostratus rostratus.** LARGE-BILLED SPARROW.—Rhoads took five typical specimens near the mouth of the Hardy. He noted that the birds were confined closely to the associations bordering the river.

The species is a winter resident in the tules around fresh water in the Salton Sink.

96. **Zonotrichia leucophrys gambeli.** GAMBEL'S SPARROW.—Observed in the bottom-land on March 30, and on the western slopes of Pattie Basin on April 7. On the latter date a single female was collected.

Rhoads obtained specimens in the Cocopahs.

97. **Spizella passerina arizonæ.** WESTERN CHIPPING SPARROW.—Obtained by Rhoads at the mouth of the Hardy and elsewhere.

98. **Spizella breweri.** BREWER'S SPARROW.—Migrating Brewer's Sparrows were not uncommon on the open desert during our southward journey. A male was shot on March 29, and a female, the last one seen, on April 19. Rhoads found the species both in the delta and the mountains.

99. **Junco hyemalis hyemalis.** SLATE-COLORED JUNCO.—"One typical male example from the Cocopah Mountains, February 24" (Stone and Rhoads).

100. **Junco hyemalis thurberi.** THURBER'S JUNCO.—"Three specimens from the Cocopahs, one of them not typical,

but nearer to this than any other form" (Stone and Rhoads).

101. **Amphispiza bilineata deserticola.** Desert Sparrow.—Two or three were observed, and one collected in the Cocopahs by Rhoads. "This is a bird of the upland deserts; not one was seen in the riparian belt" (Grinnell, 1914, 173).

102. **Melospiza melodia fallax.** Desert Song Sparrow.—Song Sparrows were not uncommon along water courses around Mexicali, and we occasionally saw or heard them in the delta. Examples were collected by Rhoads.

Some or all of the birds observed may, of course, have been referable to *M. m. saltonis* Grinnell.

103. **Pipilo aberti.** Abert's Towhee.—A bird of the outer associations of the riparian belt, and probably a breeder in the region. Specimens were obtained by Rhoads in both the delta and the mountains.

104. **Guiraca cærulea lazula.** Western Blue Grosbeak.—On our first trip to the delta we saw no Blue Grosbeaks, the species having probably not yet arrived from the tropics. But when Mrs. Murphy and I started down the river from Volcano Lake, on April 26, we found these birds swarming in the sandy openings west of where the twisting Hardy passes the mud volcanoes. Here they were feeding on the ground in company with Mourning Doves. A male collected on that date had not yet lost the brownish edgings of the feathers on nape and back.

105. **Hirundo erythrogastra.** Barn Swallow.—Several seen in Mexicali on April 24.

106. **Iridoprocne bicolor.** Tree Swallow.—Several flocks seen by Rhoads, and one specimen collected.

107. **Tachycineta thalassina lepida.** Northern Violet-green Swallow.—"Of large flocks seen some seemed to be this species" (Rhoads). This swallow is not uncommon in the Imperial Valley in winter.

108. **Riparia riparia.** Bank Swallow.—On April 1 several Bank Swallows were observed at the base of Cocopah Mayor. Again, on April 26, I saw numbers foraging over the flooding Hardy. Rhoads noted several along the river in February.

109. **Bombycilla cedrorum.** Cedar Waxwing.—"Not many seen" (Rhoads).

110. **Phainopepla nitens.** Phainopepla.—Mexican name, "Coronado Prieto." Common throughout the region, especially in the mesquites below the Cocopahs and in the Wash Association west of Pattie Basin. About the Tres Pozos water-hole several pairs were usually in evidence. They doubtless fed on the mistletoe berries in neighboring mesquites and ironwood trees.

I found that the best way to approach these restless birds, which flew so erratically from perch to perch, was on horseback. The three males and two females collected were all shot from the saddle.

111. **Lanius ludovicianus excubitorides.** White-rumped Shrike.

112. **Lanius ludovicianus gambeli.** California Shrike.

These dashing tail-waggers were not uncommon at the edge of the desert south of Mexicali, and in the Wash Association west of Pattie Basin, where they seemed to be breeding. We saw none along the Hardy.

Of three specimens taken by Rhoads, Stone writes that all "come nearer to *gambeli* than any other race, though they are not quite typical." I should call my single specimen, a male taken on April 19, *excubitorides*, though with a similar reservation as to its precise status. Imperial Valley shrikes have always been referred to the subspecies *excubitorides*.

113. **Vermivora celata lutescens.** Lutescent Warbler.—One obtained by Rhoads on February 16.

114. **Dendroica æstiva sonorana.** Sonora Yellow Warbler.—Common in the Wash Association on the western side of Pattie Basin, where a breeding male was taken on April 5.

115. **Dendroica auduboni auduboni.** Audubon's Warbler. —Seen once or twice in willows along the irrigation canals south of Mexicali on March 29. Rhoads found the species exceedingly abundant in the delta during February.

116. **Dendroica nigrescens.** Black-throated Gray Warbler.—A single male in full summer plumage was shot in the open desert near our first night camp on the morning of March 30.

117. **Wilsonia pusilla chryseola.** Golden Pileolated Warbler.—A single male was collected near the main irrigation canal, south of Mexicali, on April 19.

118. **Anthus rubescens.** Pipit.—Rhoads saw a very few Pipits along the Hardy, and obtained one specimen on February 18.

119. **Mimus polyglottus leucopterus.** Western Mockingbird.—Common on the ranches south of Mexicali, and equally so on the western slopes of Pattie Basin. The birds sang morning and evening, and during most of the night. They showed every evidence of breeding, and on April 10 I found a nest with four half-grown young. It was situated about five feet above the ground in a broken mesquite. The site was in a low part of the desert, on the borders of a great creosote tract near the base of the Pinto Mountains. The distance to the Hardy, the nearest flowing water, was not less than sixteen miles, and the bare flood-plain of the Laguna Salada lay between.

The Mockingbirds were much more abundant in the higher parts of the Wash Association, near the foot of the Tinajas, than on the lower slopes, although we observed several at the Tres Pozos. A male was collected on April 9.

Rhoads saw and collected three examples at Cocopah Mayor, and noted that they were beginning the song season.

120. **Dumetella carolinensis.** Catbird.—"I feel sure that this bird was seen and heard two or three times along the Hardy river" (Rhoads).

121. **Toxostoma lecontei lecontei.** LECONTE'S THRASHER.—Seen several times in the sandy stretches of the lower western slopes of the Pattie Basin. They were shy and difficult to approach, but on April 7 I pursued one through the creosote bushes on horseback, and shot it from the saddle when it took flight. It proved to be a male.

122. **Toxostoma crissale.** CRISSAL THRASHER.—Two specimens were taken in the Cocopahs by Rhoads, who saw not more than five altogether.

123. **Heleodytes brunneicapillus couesi.** CACTUS WREN.—Resident throughout practically all the region visited, particularly in the washes west of Pattie Basin. An occupied nest of the species was seen in a cholla cactus and another in a palo verde. A noisy pair of the birds was usually in evidence in the oasis around the Tres Pozos. A bob-tailed fledgling was collected on April 5 in the Pattie Basin, and a fully-grown young bird (male ?) in the desert south of Mexicali on April 19.

Rhoads collected the species in February.

124. **Salpinctes obsoletus obsoletus.** ROCK WREN.—Six specimens were taken in the Cocopahs by Rhoads, who, judging from his note on the species, was very deeply impressed by the personality of this bird.

125. **Troglodytes aëdon parkmani.** WESTERN HOUSE WREN.—Two or three were seen by Rhoads, and one collected.

126. **Nannus hiemalis pacificus?** WESTERN WINTER WREN.—"Two or three wrens seen in woods near Colony were presumably this form" (Rhoads).

127. **Telmatodytes palustris paludicola.** TULE WREN.—Two obtained by Rhoads at the mouth of the Hardy.

128. **Telmatodytes palustris plesius.** WESTERN MARSH WREN.—One specimen collected with examples of the preceding race by Rhoads.

129. **Auriparus flaviceps flaviceps.** VERDIN.—Widely distributed throughout the whole region. Rhoads caught one "in its gourd-like roosting nest" in February.

130. **Regulus calendula calendula.** Ruby-crowned Kinglet.—One taken by Rhoads, who saw many along both the Colorado and the Hardy. Specimens from this region are perhaps referable to *R. c. cineraceus* of Grinnell.

131. **Polioptila cærulea obscura.** Western Gnatcatcher.—Two collected by Rhoads, who found the species "abundant and always making a fuss out of proportion to its size."

132. **Polioptila plumbea.** Plumbeous Gnatcatcher.—Not uncommon in the desert washes. A male which appeared to be breeding was collected seven miles south of Mexicali on March 29.

The Plumbeous Gnatcatcher seems to be a bird of the low brush, while the preceding species is the tree form.

133. **Planesticus migratorius propinquus.** Western Robin.—A winter visitant in the region. Seen, sometimes numerously by Rhoads, but not observed by the writer.

134. **Sialia mexicana** subsp.—"Numerous" (Rhoads).

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ERRATA

Page 18, line 7: for "Contopus" read "Myiochanes."
In "Abstract" nos. 26–27:
Page 52: under "Dendroica," insert "coronata, 4, 28, 38."
52: after "Dovekie," for "5" read "15."
52: move "Gnatcatcher, Blue-gray, 5, 31" three lines up.
54: under "Passerculus," erase "caudacutus, 6."
54: under "Passerherbulus," insert "caudacutus, 6."
54: for "Penthestes atricapilla atricapilla," read "Penthestes atricapillus atricapillus."
54: for "Philip," read "Philipp."

Readers who discover errors in the present issue are requested to notify the Secretary, so that corrections may be made.

PUBLICATIONS

OF

The Linnaean Society of New York.

TRANSACTIONS.

Volume I, 1882, Royal Octavo, 168 pages. Out of print. FRONTISPIECE.—PORTRAIT OF LINNÆUS.

THE VERTEBRATES OF THE ADIRONDACK REGION, NORTHEASTERN NEW YORK. First Instalment. **Clinton Hart Merriam.**

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