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Memoirs of the Nuttall Ornithological Club.

No. I.

BIRD MIGRATION.

By WILLIAM BREWSTER.

CONTRIBUTED BY COURTESY OF THE AMERICAN ORNITHOLOGISTS' UNION'S COMMITTEE ON THE
MIGRATION AND GEOGRAPHICAL DISTRIBUTION OF NORTH AMERICAN BIRDS.

PART I.—OBSERVATIONS ON NOCTURNAL BIRD FLIGHTS AT
THE LIGHT-HOUSE AT POINT LEPREAU, BAY OF
FUNDY, NEW BRUNSWICK.

PART II.—FACTS AND THEORIES RESPECTING THE GENERAL
SUBJECT OF BIRD MIGRATION.

CAMBRIDGE, MASS.

PUBLISHED BY THE CLUB.

MARCH, 1886.

INTRODUCTION.

With the founding of the American Ornithologists' Union, the Nuttall Ornithological Club suspended publication of its Bulletin, or rather consented to merge that quarterly in the "Auk" for the purpose of giving the latter its undivided support. It is not now intended to withdraw, or in any way weaken this support, but as the Auk is already overcrowded and often unable to accept long papers, the Club has decided to begin a series of Memoirs, which will be issued irregularly, as material offers, each to consist of a single paper, or of several papers relating to the same or kindred subjects.

Of this series, the following article is the first. It was originally presented by Mr. Brewster to the American Ornithologists' Union's Committee on the Migration and Geographical Distribution of North American Birds. The Committee being unable to publish it at once, the Chairman, Dr. Merriam, has kindly offered it to the Club, with the following letter :

WASHINGTON, D. C.,
JANUARY 26, 1886.

WILLIAM BREWSTER, ESQ.,
President Nuttall Ornithological Club,
Cambridge, Mass.:

DEAR SIR :

In response to your letter of the 21st inst., I beg to say that I have read your paper on Bird Migration with much interest. I regard it as a communication of unusual importance and thank you for your courtesy in presenting it to the American Ornithologists' Union's Committee on Bird Migration.

The Committee regrets its present inability to publish the document as soon as its importance demands, and therefore, in accordance with your suggestion, returns it herewith, in the hope that the Nuttall Ornithological Club will issue it at once as a special contribution.

Very truly yours,

C. HART MERRIAM,
*Chairman of the Committee on the Migration
and Geographical Distribution of North
American Birds.*

PART I.

OBSERVATIONS ON NOCTURNAL BIRD FLIGHTS AT THE LIGHT-HOUSE AT POINT LEPREAUX, BAY OF FUNDY, NEW BRUNSWICK.

THAT myriads of the smaller land birds are killed annually during their migrations by flying against our light-houses is now well known, and various data bearing on this sad fact have been collected,—as well as to some extent formulated and published,—especially since the Migration Committee of the Union began its useful work. But as the various observers have been usually light-keepers or their assistants, their records relate chiefly to such matters as the dates at which the heaviest flights have occurred, the direction of the wind and conditions of the weather at the time, and the number and kinds of birds killed. In short, no trained ornithologist seems to have studied the subject in the actual light of a government lantern, or at least to have given the world the benefit of such an experience. On this account the following notes, made in 1885 at Point Lepreaux,* New Brunswick, may be acceptable.

Point Lepreaux Light-house is a strongly built wooden tower of the usual tapering shape, perched on the very edge of a vertical cliff at the extremity of the point from which it takes its name. There are two lights in the tower, both in the same vertical plane. The upper or principal light is eighty-one feet, the lower fifty-three feet, above high water mark. The former, a fixed white light, belonging to the class known as “catoptric,” is visible fifteen miles in clear weather, between the bearings W.N.W. around by S. to E. by N. The latter, a “dioptric” light of the sixth order, is visible about six miles.†

The upper or principal lantern is in the top of the tower, immediately beneath a conical tin roof having projecting eaves and a wide-mouthed

* Point Lepreaux, or Cape Lepreaux as it is sometimes called, is situated on the west shore of the Bay of Fundy, near its mouth, in latitude $45^{\circ} 23' 40''$ N., and longitude $66^{\circ} 27' 39''$ W.

† The above data are taken from the “List of Lights and Fog Signals of the Coasts, Rivers and Lakes of the Dominion of Canada,” published by the Canadian Department of Marine. Despite this authority I cannot believe that the height of the lanterns is correctly given. The lower lantern cannot possibly be over forty feet above high water mark, and I doubt if it is much more than thirty.

ventilator. It is encircled by a platform about five feet in width, supported by iron stays, and protected outwardly by an iron railing. In shape it is octagonal, two of the sides (those towards the land) being of iron, the other six, heavy panes of plate glass. The light is supplied by five large kerosene lamps backed by silver-lined reflectors. These lamps form three quarters of a circle, the space between them and the outer glass being about three feet

My stay at Point Lepreaux lasted nearly seven weeks, from August 13 to September 26. Living at the house of the light-keeper (Mr. G. H. Thomas), within a few yards of the light-house itself, I was able to keep a close watch on the movements of the birds, and I believe that no flight of importance escaped my notice. At the time of my arrival the migration of many of the smaller land birds had begun. Nearly every morning brought new comers to the Point, and at night, especially after August 20. Thrushes and Warblers were often heard passing overhead. But up to the close of the month there was no considerable movement, at least of species which migrate by night. Rather it was like the gradual setting of ocean currents immediately after the turn of the tide. During this period the weather was unfavorable for birds to be attracted to the light, and none were seen there either living or dead.

The first real "rush" occurred on the night of September 1, and, for the two weeks following the feathered tide flowed swiftly and more or less steadily, marking its course through the star-lit heavens by the incessant chirping of its passing legions, in thick weather surging confusedly about the light, wrecking many a bird life against the fatal shaft, and at daybreak leaving hundreds of tired little travellers stranded in the scanty covers of the Point. With this date then begin my notes on "Birds about the Light."

Sept. 1. Night cloudy and dark, but not foggy. Wind southwest, light. At ten o'clock small birds appeared about the lantern in considerable numbers, and for the succeeding two hours a dozen or more were constantly in sight, skimming along or across the pathway of light. Every now and then one would fly directly against the glass, sometimes striking it with considerable force, but oftener merely fluttering against the pane. During the evening two killed themselves outright, and seven were hopelessly disabled. These nine specimens represented eight species, seven of which were Warblers (*Dendroica virens*, *D. maculosa*, *D. pennsylvanica*, *D. caerulescens*, *Gothlypis philadelphia*, *G. trichas*, and *Setophaga ruticilla*) and one a Vireo (*V. olivaceus*). A tenth (*Empidonax trailli*) entered the mouth of the ventilator and came down through it into the lantern, uninjured. The majority, in fact fully ninety per cent, did not strike, but after dallying with the danger passed on, marking their progress westward by incessant chirping. Others were constantly arriving, heard at first faintly in the

distance, then nearer, and finally joining the throng within the circle of light.

Sept. 4. A clear cool day; the evening perfectly clear up to ten o'clock, when a heavy curtain of clouds rolled overhead from the north-west, and it became very dark. An hour later dense fog set in, and at midnight it began to rain, heavy showers succeeding one another at frequent intervals. Wind south; puffy, at times strong.

As soon as the sky became overcast small birds began to come about the light. Their numbers increased steadily from ten to eleven o'clock, but during this time the majority kept at a safe distance, and only two or three struck. With the advent of the fog they multiplied tenfold in the course of a few minutes. For the next hour from fifty to a hundred were constantly in sight, and from one to eight or ten dashing at the lantern. About seventy-five per cent struck the glass with slight force, fluttered down the pane, and dropped to the platform beneath, exhausted, but uninjured. After a moment's rest these would make off with uncertain flight, usually disappearing in the darkness, sometimes returning and striking again, always harder the second time. About twenty per cent struck so forcibly as to injure themselves beyond hope of recovery, often, however, fluttering off the platform and down to the ground beneath. Not over five per cent were killed outright. None of the killed or wounded were defaced externally, but all had one eye slightly bulged out and more or less blood settled about it under the skin. With the beginning of the rain their numbers diminished rapidly,* but a larger percentage struck, and they also struck harder.

I remained on the lighthouse from ten o'clock until two the next morning. During this time fully two hundred birds came against the lantern. Of these at least fifty were killed or disabled, and I caught and examined probably fifty more which were too wet or exhausted to fly after dropping on the platform. About forty per cent of the specimens identified were *Geothlypis trichas*, forty per cent more *Virco olivaceus*, with the remaining twenty per cent made up of *Turdus alicia*, *T. swainsoni*, *Dendroica pensylvanica*, *D. maculosa*, *D. castanea*, *D. Blackburniae*, *Setophaga ruticilla*, and *Sylvania canadensis*.

At the height of the *mêlée* the scene was interesting and impressive beyond almost anything that I ever witnessed. Above, the inky black sky; on all sides, dense wreaths of fog scudding swiftly past and completely enveloping the sea which moaned dismally at the base of the cliffs below; about the top of the tower, a belt of light projected some thirty yards into the mist by the powerful reflectors; and in this belt swarms of birds, circling,

*They were probably obliged to seek the nearest shelter, for many that came to the lantern had their plumage so water-soaked that they could hardly fly.

floating, soaring, now advancing, next retreating, but never quite able, as it seemed, to throw off the spell of the fatal lantern. Their rapidly vibrating wings made a haze about their forms which in the strong light looked semi-transparent. At a distance all appeared of a pale, silvery gray color, nearer, of a rich yellow. They reminded me by turns of meteors, gigantic moths, Swallows with sunlight streaming through their wings. I could not watch them for any length of time without becoming dizzy and bewildered.

When the wind blew strongly they circled around to leeward, breasting it in a dense throng, which drifted backward and forward, up and down, like a swarm of gnats dancing in the sunshine. Dozens were continually leaving this throng and skimming towards the lantern. As they approached they invariably soared upward, and those which started on a level with the platform usually passed above the roof. Others sheered off at the last moment, and shot by with arrow-like swiftness, while more rarely one would stop abruptly and, poising a few feet from the glass, inspect the lighted space within. Often for a minute or more not a bird would strike. Then, as if seized by a panic, they would come against the glass so rapidly, and in such numbers, that the sound of their blows resembled the pattering of hail. Many struck the tin roof above the light, others the iron railing which enclosed the platform, while still others pelted me on the back, arms, and legs, and one actually became hopelessly entangled in my beard. At times it fairly rained birds, and the platform, wet and shining, was strewn with the dead and dying.

Sept. 5. At half-past nine in the evening (after a clear, cool day) a cloud bank rapidly spread overhead from the northwest. At ten o'clock the night was very dark, the wind northeast and blowing heavily. Soon afterward rain began to fall in torrents, and with the first shower came the birds in great numbers. Several struck the lantern each minute, and with such force that nearly every one was instantly killed or disabled. The strong wind swept them off the platform as fast as they fell, the wounded fluttering noisily down the shingled walls of the tower against which they vainly attempted to cling. It was short, sharp work, for by half-past ten they ceased striking, although the air was still full of them. At half-past eleven the sky cleared along the western horizon, and the birds at once disappeared.

On this occasion I picked up fifteen birds, either on the ledge or at the base of the tower. Many others, which were disabled, fell into the sea or drifted off with the wind. The bulk of the flight was composed of Vireos (*V. olivaceus*). Besides these I examined or identified one specimen each of *Dendroica pensylvanica*, *D. castanea*, *D. blackburniae*, *D. maculosa*, *Seiurus naevius*, *Turdus swainsoni*, *Contopus virens*, and two *Dolichonyx oryzivorus*.

Sept. 7. At half-past ten o'clock this evening, after a clear and rather

warm day, a fog bank drifted in, shrouding everything on the Point, but not entirely obscuring the stars which twinkled dimly overhead. On reaching the top of the tower I found five dead Warblers on the platform, and for the half hour immediately following birds struck hard and rapidly. There were seldom more than three or four in sight at any one time, but they did not dally with the danger as on former occasions, but flew directly at the lantern. There was little wind, and they came equally from every side. I caught and picked up about twenty-five, the majority *Geothlypis trichas* and *Dendroica maculosa*, with *Virco olivaceus* next in numbers, but much fewer. Besides these I examined one each of *Dendroica caerulescens*, *D. castanea*, *Parula americana*, and *Turdus swainsoni*.

Sept. 8. Night perfectly clear up to ten o'clock when I went to bed. At daylight the next morning it was raining hard, and I found a wounded *Geothlypis trichas* at the base of the light-house, and on the upper platform a *Virco olivaceus* and an *Ereunetes pusillus*, both dead.

Sept. 9. Night dark as pitch, with strong, chill east wind, and heavy rain at intervals. At eight o'clock two or three birds began skimming warily about the light, but none struck, and they soon disappeared. After ten o'clock there was not a bird in sight or hearing.

Sept. 13.—Night cloudy and dark. Wind west, blowing strongly. A few birds appeared around the light at nine o'clock, and remained there during the succeeding two hours, four or five striking, but only one (a *Dendroica maculosa*) being disabled. Most of the time they kept well to leeward of the lantern, breasting the wind with difficulty.

The above records are taken without essential change from the corner of my note book devoted to "birds about the light." They include everything of importance in that department, but in connection with them I have also consulted another set of notes relating to the diurnal presence or movements of birds at Point Lepreaux. Taking both records into account I find that:

(1) No birds came about the lantern except during densely cloudy or foggy weather.

(2) That they came in the greatest numbers when the night for the first hour or two was clear and free from fog.

(3) That with a single exception all the nights on which the heavy flights occurred were preceded by clear, cool days.

The exception just mentioned was the night of September 1, which was preceded by a densely foggy day. During this day, however, the woods over the entire Point were literally swarming with small birds which must have arrived about daybreak, and which were undoubtedly encouraged to push on by the disappearance of the fog at sunset. Perhaps they found the covers of the Point uncongenial or poorly supplied with food, and were intending merely to cross to the opposite mainland when they were stopped by the fascination of the light.

From these facts it seems probable that the smaller birds usually select clear nights* for their perilous journeys southward, and that they start soon after dark. It is equally clear that they cannot foresee sudden changes of weather,—at least local ones, such as occurred on several of the nights just described.

At Point Lepreaux several species which are usually regarded as nocturnal migrants, migrated also—at least to some extent—by day. I repeatedly saw Yellow-rumped and Yellow Red-poll Warblers arrive at and depart from the extremity of the Point at various hours, but usually early in the forenoon. On leaving, they would mount upward in a broad spiral, and upon reaching an elevation of about five hundred feet would strike boldly out over the sea, heading for Campobello dimly visible some twenty miles away. Frequently a dozen or more would follow one another in quick succession, chirping loudly at frequent intervals until out of sight and hearing. It is not probable, however, that such movements were anything more than mere flittings from one headland to the next, but the fact that they invariably took a generally westward direction (the course followed by most autumnal migrants in this locality) shows that they were really short steps in the long autumnal journey.

I mention them in the present connection, however, chiefly because of the light which they shed on the manner in which small birds start on their travels, and the height at which they fly. If a bird finds it necessary or convenient to mount to a height of five hundred feet before undertaking a flight of only twenty miles, it is probable that it rises much higher before attempting one of several hundred miles. Indeed the observations lately recorded by Messrs. Scott and Allen would seem to show that even the smaller land birds sometimes perform their nocturnal migrations at the surprising elevation of *from one to two miles*.†

*That is to say, they usually *start* when the weather is clear. The journey may be continued after the sky has clouded over, as we know is often the case.

† Bull. N. O. C., Vol. VI. 1881, pp. 96, 100, and 188.

PART II.

FACTS AND THEORIES RESPECTING BIRD MIGRATION.

It has been long supposed that our smaller nocturnal migrants, such as Thrushes, Warblers, Vireos, and Sparrows, travel either in small flocks or singly, according to circumstances or the habits of the different species. It has been further assumed—very naturally, in view of the difficulty of obtaining direct evidence—that both flocks and single birds fly at wide intervals apart and more or less independently of one another. This has led to the belief that birds possess a sense of locality and direction, either inherited or wholly mysterious, for in no other way has it been possible to explain the fact that, under favorable circumstances, young birds, apparently alone and unguided, regularly find their way over thousands of miles of country which they have never before seen.

Various theories have been advanced to account for this remarkable feat, but all, as far as I have seen, are inadequate and unsatisfactory; and naturally, for they are based partly on false premises and largely on a misconception of the character and extent of nocturnal bird flights. The simple truth is, as I am convinced by long observation, and as I hope to be able to show, that while these birds really do travel both singly and in flocks, the different flocks and individuals do *not* move independently. On the contrary, the conditions which cause one flock, family, or individual to start southward are ordinarily so wide spread and generally operative, that countless flocks, families, and individuals are set in motion at nearly the same time, and the members of each flock or family, instead of flying in close order, scatter about sufficiently to approach or mingle with the stragglers of other flocks or families. Thus in effect they form a continuous but straggling army, often hundreds of miles in length, and varying in breadth according to the character of the country over which it is passing.

Over a wide, level, and generally uniform region the host spreads out in thin order; following a river valley, it contracts and thickens; and at narrow passes, such as the Straits of Mackinac,* it focuses its myriads into a solid stream.

* See the Auk, Vol. II, January, 1885, p. 64.

As is well known there are certain definite routes or paths of migration along which birds pass in especially great numbers. These are usually coast lines, river valleys, or continuous mountain ranges. Towards them converge innumerable less frequented paths, each of which in turn has still smaller tributaries of its own. Thus bird streams, like brooks, flow into common channels, and each particular region may be said to have its bird, as well as water, shed. An important consideration is that the tributary bird streams follow courses in no wise strictly dependent on points of compass.

Bearing these facts in mind, the manner in which birds find their way seems very simple. From the height at which they fly the country presents the appearance of a map on which, in the light of the moon or stars, the mountain ranges, plains, lakes, rivers, and sea coasts are more or less distinctly outlined for a hundred miles or more in every direction.* Guided by such landmarks the older birds can have no difficulty in following paths which they have repeatedly traversed before, and they unquestionably direct and perhaps lead all the larger flights, although it is by no means certain or even likely that they do this in a systematic manner, or that their leadership is distinctly recognized or realized by the younger birds who accompany or follow them. On the contrary the latter are probably directed, as well as perhaps urged onward, simply by the contagion of general example and a desire to keep within sight or hearing of their companions; both strong influences with birds, especially very young ones which have only lately passed from a state of complete dependence and are still not wholly independent. That a very few experienced old birds could thus direct and guide the movements of thousands of inexperienced young is to my mind obvious, but the point perhaps calls for further discussion and explanation.

There are various instances on record of migratory birds, such as Geese and Ducks, which, in confinement, have shown unmistakably, at the proper season, an absorbing desire to set out on their accustomed travels. That such an impulse is very general, and in most cases probably irresistible, with old birds, is certain. It is not, however, equally clear that it is *inborn*, at least with *all* birds. I grant that it may be so with many and probably is so with some. But example is a strong influence with all creatures of limited reasoning powers, and it seems to me sufficient to explain the migratory movements of most small birds. The young, at first led about by their parents, soon join other broods, and very quickly large flocks are formed. In these flocks there are always a few old birds which, when the proper time came, would set the example by mounting into the air and

* Anyone who has spent a clear night on the summit of a mountain will not question this statement.

starting southward. The younger birds would naturally follow straggling after, but all keeping the same general direction and in sight or hearing of one another, precisely as they do by day when scattered about in woods, thickets, or fields.

It is not necessary to assume, nor in my opinion is it likely, that these flocks keep intact throughout the whole of their long journey. During even its earlier stages, their members must become by turns separated from one another and associated with birds of the same or different species belonging to other flocks which may have started from various localities, but which are travelling in the same direction and along the same or parallel paths.* But whether among friends or strangers, the contagion of example would not fail to act on every favorable occasion, at least as long as old birds were present. Moreover, the young would quickly learn to start without such leadership, and, once in the air, straggling parties and individuals would soon fall in with the general tide of migrants flowing ceaselessly overhead. Thus the force of example would continue to direct, after it was no longer needed to incite, these nocturnal flights until the final destination was reached.

All animals have a strongly developed sense of locality and direction. They observe keenly, and readily recognize places and landmarks which they have seen before. Hence it is not surprising that birds quickly learn to follow a path, even for thousands of miles, along which they have been in the first instance led by older companions, and the young bird after a few seasons would become an experienced guide.

It may be asked in this connection how the various species which start together or join one another during the early stages of the journey, separate again, as must be the case, when they reach a point beyond which their routes diverge. An answer to this question was suggested at Point Lepreaux by the fact that, while many species of birds arrived together on the same night, and mingled indiscriminately in the neighboring woods during the following day, they did not invariably depart together or in exactly the same direction. This leads me to believe that similar places along every route constitute what may be called stations or points of departure. At such places—ordinarily promontories extending into the sea, points of timber bordering extensive plains, or the extremity of mountain ranges—the migratory tide hesitates and halts before venturing on the dangerous stage ahead, and (as we know to be the case) birds of various species quickly collect, often in extraordinary numbers. This pause allows the stragglers to come up, and when the host again starts, the different

* That this is really the case is shown by the frequent association during migration of species which we know must start from widely different localities.

leaders are naturally followed by all the members of their own particular species. I believe further that the southern extremity of the Alleghanies is the chief point of departure in the Eastern United States.

It may be further objected that the adults of many, or, as I believe, *all* species migrate southward first, and often several weeks in advance of the young. It is perfectly true, nevertheless, that a few old birds are always to be found in the larger flights, although the latest of these are certainly composed mainly of young. The two facts taken in connection, however, seem to me to strengthen rather than weaken the conclusions just advanced, for it is evident on the one hand that many of the smaller parties must be entirely without experienced leaders, and equally clear on the other, that a few such guides must always mingle in the armies which these parties collectively form.

Another possible objection which has occurred to me is that the flood tide of migration is preceded, as well as closed, by more or less local or limited movements, during which the birds at any one time on the wing must be too few and scattered to constitute an uninterrupted stream. How then do they find their way? It may be answered that the earlier flights can have no difficulty, for, as already stated, they are made up chiefly, if not wholly, of old birds, who, being familiar with the route, are independent. With the closing flights there is more trouble, for these, as we have also seen, are composed chiefly, and in some cases entirely, of young. But is it necessary to assume that such tardy travellers* often reach their southern destination, unless fortuitously and after long wanderings? Are they not much more likely to perish of cold or hunger, or to furnish some of the many recorded cases of exceptional wintering or other unusual occurrence? As far as I have seen, accidental visitors to Massachusetts, almost without exception, are young birds, and the majority also are taken very late in autumn,—facts of obvious significance in this connection.

During the preceding argument I have assumed several facts which are so essential to my conclusions that I find it necessary to give, at least briefly, the evidence on which they rest. It is as follows:—

1. That these birds migrate either singly or in straggling bands is shown by the fact that at Point Lepreaux they invariably arrived at the lantern in this order and never in compact flocks. Less conclusive but more familiar testimony is the fact that they are always seen by daylight either in loose, scattered parties or singly, and never in flocks, such, for instance, as are formed by Bobolinks and Blackbirds.

* I have repeatedly noticed that late stragglers are apt to be found in company with species with which they do not usually associate. Hence it is probable that they often avail themselves of the companionship and guidance of any birds which may be passing at the time.

2. That the different bands are sufficiently scattered and connected with other bands to form a practically continuous stream of birds is also proved by my experience at Point Lepreaux: for during nights which were dark or foggy enough to make the lantern attractive, but not sufficiently thick to prevent the birds from continuing their journey after flying about it a few times, there was often not a minute for hours when several birds were not arriving within its circle of light from the east, and an equal number departing towards the west.

3. That the conditions at Point Lepreaux were not unusual, and that the sky during a night favorable for migration is ordinarily alive with birds, may be learned by anyone having keen hearing who will take the trouble to stand for a few hours on some elevated spot and listen intently. I have done this many times, and at various places, when the faint, lisping notes of Warblers and the louder calls of Thrushes could be heard in every direction and at intervals never exceeding a few seconds. The telescopic observations by Messrs. Scott and Allen, elsewhere alluded to, also furnish valuable evidence, both on this point and on those treated in sections 1 and 2.

4. That with most North American birds the majority of adults either precede or accompany the first flights of young in the autumnal migration I am convinced by a long field experience, during which, moreover, I have failed to find any proof that the young of a single species precede the old. My evidence in support of this statement is of two kinds: (1) Observations made on the departure of birds from their breeding stations. (2) Observations on flights arriving from localities north of the stations of observation. The first class of evidence, in my opinion, is much the more reliable, for reasons which will be given presently. It includes a long array of notes, from which I select and condense the following:—

At all points where I have collected regularly and systematically through July, August, and September, I have found that the adults of most of the smaller land birds which migrate before October, and especially of those which migrate by night, begin to disappear as soon as the young become able to shift for themselves. Their departure is usually gradual, and often scarcely perceptible from day to day; but before there is any appreciable diminution in the number of young the adults have become so scarce that they commonly represent less than five, and often not more than one per cent of the total number of individuals of their respective species present. As a rule they disappear as soon as, and often before, they have completed their summer moult, whereas the young usually linger for some time after their autumnal plumage is perfected. Every New England collector who has paid especial attention to obtaining adult birds in full autumnal dress will testify to the truth of this statement. With the Warblers there is

often the greatest difficulty in securing such representatives of even the commonest species.

My experience with species which come from further north is that the first flights are composed largely, and often entirely, of old birds. The reason why this fact has been overlooked, or even positively denied by so many observers, becomes apparent when we consider the dates at which even the earlier autumnal migrants are said to reach Massachusetts from the north. Almost without exception the time is fixed somewhere in September, and I venture to say that the majority of New England collectors still believe that September 1 marks about the beginning of the autumnal migrations. This impression has resulted from the fact that our collectors are usually absent at the mountains or seashore during August. Even if obliged to pass the dog days nearer home, they rarely think of taking the field at a time when it is supposed that there is nothing of value to be had there. The weather is hot and enervating, the foliage is at its densest, "birds are silent and hard to find, and most of them in such ragged plumage that they are worthless as specimens."

Now the simple truth is that the migrations of most of our small birds begin early in August. During the last two weeks of that month there are usually several real "rushes," when the woods throughout Eastern Massachusetts are filled with such northern species as *Turdus swainsoni*, *Sitta canadensis*, *Dendroica coronata*, *D. maculosa*, *D. blackburni*, *D. castanea*, *Sylvania pusilla*, *S. canadensis*, *Sciurus norcboracensis*, *Empidonax flaviventris*, etc.

In these August flights I have always found a large percentage of, and in some cases nothing but, old birds.* Towards the close of the month the proportion of young to adults increases daily, and after September 1 it is rare to find more than one or two old birds in even the largest mixed flocks.

There are apparent exceptions to this rule, a marked one being *Oporornis agilis*. This species arrives at Cambridge about September 12, and during the remainder of the month is so abundant in the Fresh Pond swamps that from ten to twenty specimens may be often found there in a single day. The adults, however, are so very uncommon that I have never known them represent more than five per cent of the total number of individuals. They do not seem to be more numerous in the earlier flights than towards the close of the month, and I am very sure that they cannot be found in this locality before the young begin to appear. Nevertheless I believe (although I have no proofs of such a theory) that they, in common with the adults of other

*Near Cambridge, Mass., on August 23, 1884, I met with a flock of about twenty *Dendroica coronata*, all adults, in various stages of moult. They of course came from further north, as the species does not breed in Massachusetts. Who has ever found such a flock in *September*?

species which *seem* to be exceptions to my rule, really do migrate (that is to say, the majority do) in advance of the young, but either by different routes or without stopping at the same places. Indeed, no other explanation seems possible, for it would be absurd to suppose that in the case of *Oporornis agilis* or any other species which lays but four or five eggs, there are in autumn only five old birds to every hundred young.

Hence the fact that the earlier flights of any given species are made up largely or even almost entirely of young birds, furnishes no proof that the young of that species migrate first, unless it can be further shown that the later flights in the same locality consist chiefly of old birds. In short the latter must be accounted for in some way, or they cannot be used as a factor in the case. A flight chiefly or largely of old birds, succeeding one similarly composed of young of the same species, has never come under my observation, and I venture to assert that such a phenomenon never occurs unless under purely fortuitous conditions.

With Limicolæ, as far as I have observed them, the earlier flights are composed almost wholly of old birds, the later ones of young. During many seasons' shooting on the salt marshes of the New England coast I have invariably found this to be true of all the species which occur in sufficient numbers to furnish conclusive evidence. On more than one occasion in July shooting I have seen large flocks of Yellow-legs, Snipe (*Macrorhamphus*) and Ring-necks (*Ægialitis semipalmata*) composed *entirely* of old birds in worn breeding plumage.

5. That migratory nocturnal flights often start simultaneously over thousands of square miles of country, that they frequently converge and unite, that the routes which they follow usually correspond more or less closely with the trend of mountain chains, river valleys, the shores of lakes or seas, or the wooded borders of extensive plains, and finally that these routes for considerable distances are not always exactly or even approximately in line with the general direction of the migration, are facts too firmly established and widely known to require detailed consideration here.

Thus far I have dealt only with diurnal-feeding land birds which migrate by night. Turning now to land birds which migrate as well as feed by day, we find that the majority of species fly in large, compact flocks, not only when migrating, but at all other times except during the breeding season. These flocks almost invariably contain more or less old birds who seem to be recognized as leaders, and whose movements or signals are closely followed and obeyed. That these old birds act as guides during migration, and that the younger birds depend on them in this way, is unquestionable. If the old birds are killed or otherwise lost, the young may be thrown on their own resources for a while, but they rarely have to wait long for an opportunity to join, or at least follow, another flock. Thus, as

with nocturnal-moving species, the old birds lead the young, but of course in a more direct and systematic manner.

There are several species and groups of diurnal-migrating birds whose flights are to some degree similar to those of the nocturnal migrants. The best examples among land birds are Swallows, Swifts, and Hawks.*

It will be noticed that I have hitherto made no direct allusion to what are called pelagic species, and it may be urged that my theory, both as a whole and in detail, is not adequate to account for the movements of these birds. This I admit, but I maintain on the other hand that the habits, manner of feeding, and migrations of pelagic birds are so radically different from those of land birds, or even of wading and swimming birds which feed and migrate along or near the shores of the sea, that they do not necessarily come under the same laws. My experience with pelagic birds has been perhaps as extensive as that of most ornithologists, but so far it has failed to suggest any very satisfactory answer to the question how they find their way to and from their breeding grounds over the pathless sea. I believe, however, that they use coast lines and oceanic islands as guides, at least to some extent. These can be made out by the human eye at a distance varying from twenty to a hundred miles according to circumstances, and birds have much keener eyes than men. A very few old individuals who have recognized and set their course by some distant landmark, may start and direct thousands of their own and allied species over a vast area of ocean, for, although most pelagic birds scatter about and seem to act quite independently, they are quick to notice and interpret one another's motions. A bucketful of fish offal thrown from a vessel will often collect hundreds of Gulls or Petrels in a surprisingly short space of time, when a moment before only one or two were in sight. The explanation is very simple. A bird spies the feast and hurries towards the spot. Its eager, direct flight betrays the secret to a more distant bird, who in turn attracts and directs still more distant ones. Vultures assemble in a precisely similar way. Thus, whatever the marks of locality or direction may prove to be, they need be seen and followed by only a few individuals. In short, dispersion over wide areas is in reality the surest means of finding the way. Hounds recognize, or at least act on this principle, when they scatter in search of a lost trail.

Before concluding I cannot forbear touching on another point which, although not strictly pertinent in this connection, has a direct and important bearing on the general subject of migration; it is the question, Why do some birds migrate by night, others by day?

* One has only to compare the numbers of Swallows, Swifts, and Hawks in any particular locality, with those of the birds which migrate by night, to understand why the flights of the former are not as extensive as those of the latter.

Excluding for the moment the wading and swimming birds, as well as all land birds which are habitually nocturnal or crepuscular, I find that the migratory birds of our Atlantic States may be divided into two classes as follows :

1. Birds which migrate exclusively* by night embrace *Turdidæ* (except *Merula* and *Sialia*), *Sylviidæ*, *Paridæ*, *Sittidæ*, *Certhiidæ*, *Troglodytidæ*, *Sylviolidæ*, *Tanagridæ*, *Vireonidæ*, *Fringillidæ* (except *Pinicola*, *Carpodacus* (?), *Loxia*, *Ægiothus*, *Chrysomitris*, and *Plectrophenax*), *Sturnella*, *Icterus*, *Tyrannidæ* (except *Tyrannus*), *Cuculidæ*, and *Picidæ*.

2. Birds which migrate freely, chiefly, or exclusively by day are *Merula*, *Sialia*, *Otocoris*, *Anthus*, *Ampelis*, *Hirundinidæ*, *Lanius*, *Icteridæ* (except *Sturnella* and *Icterus*), *Chætura*, *Trochilus*, *Corvidæ*, *Falconidæ*, and *Columbidæ*.†

While at Point Lepreaux I adopted an arrangement similar to the above for systematizing and comparing notes relating to the birds observed there. I had hoped that it might lead to something definite, and this proved to be the case, for it quickly suggested the following generalizations which, as far as I can now extend and test them, seem to be without flaw.

1. Species which migrate exclusively by night habitually feed in or near the shelter of trees, bushes, rank herbage or grass, and when not migrating are birds of limited powers of flight and sedentary habits, restricting their daily excursions to the immediate vicinity of their chosen haunts. As a rule they are of timid, or at least retiring disposition, and when alarmed or pursued seek safety in concealment rather than by extended flights.

2. Species which migrate chiefly, or very freely by day, habitually feed in open, exposed situations, and in their daily excursions for food often cover considerable distances. As a rule they are of bold, restless disposition, and when alarmed or pursued seek safety in long flights rather than by concealment.

3. Species which migrate exclusively by day, habitually feed either on the wing or over very extensive areas. In disposition they are either trustful and unsuspecting, or wary and self-reliant. Without exception they are birds of strong, easy flight, and rely solely on their wings for escape from danger.

If these premises are accepted, and I do not see how they can be rejected, they lead easily, if not irresistibly, to the conclusion that :

Timid, sedentary, or feeble-winged birds migrate by night because they

* Several of the species included in this category unquestionably migrate, to some extent, by day; but their diurnal flights are never more than short flittings, as from one piece of woods or headland to the next.

† The manner of migration of our Kingfisher is unknown to me.

are either afraid to venture on long, exposed journeys by daylight, or unable to continue these journeys day after day without losing much time in stopping to search for food. By taking the nights for travelling they can devote the days entirely to feeding and resting in their favorite haunts. Good examples are Thrushes (except the Robin) Wrens, Warblers, and Vireos.

Bold, restless, strong-winged birds migrate chiefly, or very freely, by day, because, being accustomed to seek their food in open situations, they are indifferent to concealment, and being further able to accomplish long distances rapidly and with slight fatigue, they can ordinarily spare sufficient time by the way for brief stops in places where food is abundant and easily obtained. Under certain conditions, however, as when crossing large bodies of water or regions scantily supplied with food, they are sometimes obliged to travel partly, or perhaps even exclusively, by night. Excellent examples are the Robin (*Merula*), Horned Lark (*Otocoris*), and most *Icteridæ*.

Birds of easy, tireless wing, which habitually feed in the air or over very extensive areas, migrate exclusively by day, because, being able either to obtain their usual supply of food as they fly, or to accomplish the longest journeys so rapidly that they do not require to feed on the way, they are under no necessity of changing their usual habits. The best examples are Swallows, Swifts, and Hawks.

Nocturnal and crepuscular birds, at least migratory species, are all strong-winged and accustomed to seek their food over wide areas. Hence, like Swallows, Swifts, and Hawks, they migrate during the hours of their habitual activity.

The conclusions just reviewed will also apply to the several families and numerous genera of wading and swimming birds; for their migrations, making due allowance for the peculiar habits of certain species and groups, are easily explainable by considerations either identical with, or similar to, those above mentioned.

The Bittern, Woodcock, Wilson's Snipe, Spotted Sandpiper, and the Rails without exception, migrate exclusively* by night. They are all sedentary birds addicted to feeding in particular and usually limited areas, and all but one † seek safety, when alarmed, in concealment. Accordingly it is essentially, if not strictly, in line with the previous reasoning that they should migrate by night, and rest and feed by day. The case is not, however, exactly parallel with that of any of the land birds, for these waders (except perhaps the Spotted Sandpiper) feed habitually more by night than

* The Wilson's Snipe does occasionally migrate also by day, but only in very dark and stormy weather.

† *Tringoides* which, however, is conspicuous among *Scolopacidæ* for its comparatively feeble, restricted powers of flight.

day.* But all—even the Woodcock—also feed freely by day during the migrations.

The remainder of the wading, and all the swimming birds, † as far as I can ascertain, migrate indifferently, and more or less equally, according to circumstances, by both night and day. This again was to be expected when we consider that they feed (again without exceptions, I believe) more or less indifferently and freely at all hours, and are not accustomed to seek safety in concealment. ‡

Certain species of Ducks, as well as all the Loons, Grebes, and Auks do, however, frequently or habitually elude their various enemies by diving. Thus water is in one respect to them what grass, rushes, etc., are to Snipe and Quail—a refuge from danger. This doubtless explains a fact which I have often observed, viz. : that while most diving birds migrate freely by day *along our coast*, they invariably perform long *overland* journeys by night. The reason is obvious. In the one case flying directly over a continuous expanse of water they are able to avail themselves of its shelter at a moment's notice; § in the other they would be quite without this resource, if suddenly threatened or attacked.

With the Geese and Ducks it is even possible to trace some connection between the extent to which the different species migrate overland by day, and the dependence which they place on diving as a means of escape from danger. Thus I have found that species which never dive unless when wounded, such as Geese, Black Ducks, and Teal, migrate much more freely (overland) by day than do others, such as the Scaup Ducks, Goldeneyes, and Old Squaws, which resort to diving if cornered or otherwise hard pressed; while inveterate divers, such as the Ruddy Duck and our three Scoters, seldom if ever venture to cross a wide extent of land by daylight.

It has been shown, I trust satisfactorily, that the manner of migration of our birds is determined by one, two, or all three of the following considerations, viz. : habitual manner of procuring food, disposition, wing power. It evidently has little or nothing to do with relationship or affinities except within very narrow limits. This is proved conclusively by such cases as that of the Robin, which migrates largely, if not exclusively, by day, while its near allies, the spotted Thrushes of the genus *Turdus*, are among our best examples of strictly nocturnal migrants.

* Diurnal land birds which migrate by night are, I think, without exception, positively incapable of obtaining food after dark.

† Except strictly pelagic species, whose habits in this respect are not definitely known.

‡ The Wood Duck will often hide in rushes or among thick brush, but it is also exceptionally nocturnal in its migrations.

§ Several water birds will dive directly from on wing, if shot at, or suddenly threatened by a Hawk.

In bringing this article to a close I wish to add a few words in explanation of the way in which it was written and the spirit in which it is presented. Originally, I intended merely to arrange and formulate the notes made at Point Lepreaux, but one thing led insensibly to another until I became involved in a somewhat general discussion of bird migration. A field experience of more than twenty years furnished ample material on which my theories and deductions are chiefly, and in many cases wholly, based, very few of them having been taken at second-hand, or even suggested by the writings of others. Nevertheless I do not claim that they are generally or perhaps even largely original in the sense of being now made public for the first time. Moreover, a thorough scientific treatise on bird migration is not attempted. I merely offer some facts and theories which may or may not be new, and I leave to others the task of sifting the grain from the chaff, content if I have added anything of value to the previous store of knowledge.



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- 1855 -

Memoirs of the Nuttall Ornithological Club.

No. II.

THE IPSWICH SPARROW

(*AMMODRAMUS PRINCEPS* MAYNARD)

AND

ITS SUMMER HOME.

By JONATHAN DWIGHT, JR., M. D.

WITH A COLORED PLATE.

CAMBRIDGE, MASS.
PUBLISHED BY THE CLUB.
AUGUST, 1895.

THE IPSWICH SPARROW (*AMMODRAMUS PRINCEPS*) AND
ITS SUMMER HOME.

BY JONATHAN DWIGHT, JR., M. D.

DISCOVERED among the sand-hills of Ipswich, Massachusetts, by Mr. C. J. Maynard, and the single specimen obtained by him December 4, 1868, wrongly identified as Baird's Sparrow of the far West by no less eminent an authority than Professor S. F. Baird, the Ipswich Sparrow, for a long time after it was recognized as a new species, enjoyed a reputation for rarity which later observations have not sustained. Gradually the few energetic collectors who have cared to face the wintry winds that sweep the desolate stretches of low sand-hills fringing so much of our Atlantic coast, have proved the bird to be a regular migrant or winter visitor, found more or less abundantly from Maine to Georgia. For nearly sixteen years after its discovery there was no clue to its breeding haunts until, in 1884, a single summer specimen was obtained from Sable Island, Nova Scotia. Until ten years later no successful effort was made to solve the mystery shrouding the summer home of a shy and silent species that disappeared from our shores with the earliest breath of spring, not to return again before the frosts of autumn had browned the waving clumps of coarse grass where it makes its winter home. It was in the hope of reading some of the unturned pages of the life-history of this interesting Sparrow that I visited Sable Island during the summer of 1894. A long personal acquaintance with the bird, added to my recent observations, enables me to present a comprehensive account of a species which, a New England discovery itself, annually imitates the Pilgrim Fathers in landing on New England's shores; and I am confident my brother ornithologists, of that part of the country at least, will feel a particular interest in the new facts I am able to present regarding a species so peculiarly their own.

Perhaps one of the most interesting results of my trip has been to establish the fact that the Ipswich Sparrow is resident on Sable Island the whole year round. Moreover, it is the only land bird that makes its nest there, being known as the 'Gray Bird' to the few inhabitants. As no other breeding grounds have ever been found (and careful search has been made by several observers), Sable Island may truly be called the home of

the Ipswich Sparrow. Lying as it does far out in the ocean, nearly one hundred miles from the Nova Scotia coast, a landing upon it impracticable except in fine weather, and wrapped in impenetrable fog for weeks at a time, small wonder is it that this lonely sand-bank should have guarded its secrets for so many years. Now at last it has yielded them up, and the home life of the Ipswich Sparrow, its unknown song, its undiscovered nest and eggs, its undescribed fledgling plumage, are no longer matters of conjecture. It is my pleasant task in these pages to lay them before my readers, with some other new facts that came to my notice while exiled on the narrow strip of sand known as Sable Island. I reached there on the 28th of May, 1894, departing thence on the 14th of June. No one is allowed to land without a permit from the Dominion Government, but, thanks to kind and interested friends, this was obtained for me without the delays and red tape that are apt to discourage such efforts. From the Government officials with whom I came in contact I received every attention, and to the cordial hospitality of Mr. Robert J. Boutilier, especially, the superintendent of the life-saving service on the island, and his family I owe the great success of my expedition.

The only communication the island has with the mainland is by the Government steamer which at long and irregular intervals carries supplies thither for the seventeen men (several of them with families) who now look after the two lighthouses and four life-saving stations. The trip, if made from Halifax, usually occupies a whole day, but the boat may spend days or even weeks supplying the other lighthouses of the Nova Scotia (or occasionally the Newfoundland) coast before it proceeds to Sable Island. The frequent fogs and the impossibility of making a landing unless the wind is in the right quarter, are other sources of delay and danger in visiting the place, and to accomplish it an unlimited amount of time and patience must be at one's disposal. The voyages to and from the island actually occupied me six days, two of which were spent at anchor in the fog. As I went off in the first boat that had visited the island in five months I confess to some misgivings when the steamer left me, as to how long I might be obliged to play Robinson Crusoe. Like that gentleman I swept up the beach on the crest of a breaker, but I had the advantage of him in being comfortably seated in a surf boat. The cordiality of my reception quickly dispelled all doubts as to my surviving for an indefinite period, and when I left the island it was with regret, for everybody seemed to take an interest in my researches, and no sooner was a nest found or a bird caught than the intelligence came to me over the telephone wires that connect the different stations, and some of the domesticated wild ponies were ready in the barns to transport me wherever I wished to go.

When everything is taken into consideration, I am convinced that the Fates were unusually propitious, and enabled me to accomplish within a few weeks what might easily have taken as many months. No steamer visited the island for two months after I left it, and this impossibility of escape from a place that has absolutely no other means of communication with the outer world (not even a cable) is a serious bar to making a journey that lands the rash naturalist on a veritable *terra incognita*.

In order that we may better understand the conditions under which the birds are living there today, it will be interesting for us to glance at the history of this isolated spot, already the theme of many a pen, and important for us to dwell at some length upon the natural history, about which little has been written.

HISTORY OF SABLE ISLAND.

Whether the Dane, Biorn Heriulfson, really spied the island, as he is said to have done, in the year 986 A. D. or not, is a matter not susceptible of proof,¹ but that it was known to the navigators of the sixteenth century is shown by its appearance on early charts.² It is apparently indicated as 'santa cruz' on a chart of 1505 by Pedro Reinel, as 'st cruz' on one of 1544 by Sebastian Cabot, and as 'Isola d'ella Rena' (Sandy Island) on one of about 1550 by the Italian, Gastaldi; while it appears on various maps of later date under the names of 'isle de sable,' 'I. Sable,' etc., all ringing changes on the French word *sable*, meaning 'sand,' the adjacent mainland being in those times under French rule, and known as Acadie. The accuracy of some of the statements made by early writers regarding the island, is questionable; and whether the Frenchman, Baron de Léry, visited it and left behind him cattle and swine in the year 1518, is very doubtful; but that the Portuguese stocked it with these animals about the middle of the sixteenth century seems to be an established fact.

In 1583 occurred the first of a long series of disasters on its dangerous bars. The *Admiral*, an armed vessel in the service of Her Majesty, Queen Elizabeth, was wrecked here, and nearly one hundred lives were lost. The expedition, under command of Sir Humphrey Gilbert, half-brother to Sir Walter Raleigh, consisted of five ships, and was proceeding from Newfoundland, which island had just been taken possession of in the name of the Queen.

¹ J. M. Oxley, 'Historic Aspects of Sable Island,' Mag. Amer. Hist., XV, Feb. 1886, 163.

² Facsimiles of many of them may be found in 'Cartier to Frontenac,' by Justin Winsor, 1894, pp. 6, 53, etc.

In 1598 forty convicts were left on the island by the Marquis de la Roche, who intended to transfer them to the mainland as soon as he had selected a site for a new colony. A storm, however, presently arose that drove him eastward, and he finally returned to France where he is said to have been imprisoned. The convicts were not rescued for five or six years, when all save a dozen had perished, the survivors subsisting on cattle, seals and berries, and clothing themselves with skins and furs. During the first half of the seventeenth century the island was visited by English and French fishermen and hunters in pursuit of the seals, walruses and foxes that then abounded, and by others who hunted the cattle for their hides. In 1633 John Rose of Boston, who was wrecked upon the island, reported having seen "more than eight hundred head of wild cattle and a great many foxes many of which were black." After he had effected his escape in a boat built from the wreckage of his vessel, he returned again with seventeen Acadians, who so slaughtered the cattle that few remained when, some years later, a company arrived from Boston having the same end in view. Apparently the cattle, foxes, and walruses were exterminated at about this time, for we find little or no reference to them during the next hundred years.

About 1738 Rev. Andrew Le Mercier, also of Boston, restocked the island with some domestic animals, expecting to settle there himself. The wild ponies that to the present day are found in 'gangs' all over the island are said to be descendants of this stock, although it is thought by some that they originally came from the wreck of a Spanish vessel.¹ Since Le Mercier's time the cattle have been at least semi-domesticated, for the island became during the latter half of the eighteenth century a place of resort, not only of honest fishermen, but of pirates and wreckers, attracted no doubt by the constantly increasing number of vessels that were cast away upon it. Gruesome tales are told of the robbery and murder of the unfortunate people who escaped the sea only to fall into the hands of these miscreants, and blood-curdling ghost-stories have grown out of this dark period of the island's history. In order to protect life and property, the Government of Nova Scotia in the autumn of 1801 established on Sable Island the first relief or humane establishment, that has developed into the well-equipped life-saving service there today. Since 1801 accurate records of the havoc wrought by storms in the physical aspect of the island, and of the many wrecks that have occurred on its outlying bars, have been kept by the various superintendents. Up to 1882, no less than one hundred and

¹ For an account of them see J. B. Gilpin 'On introduced species of Nova Scotia,' Trans. N. S. Inst. Nat. Sci., Vol. I (printed II), pt. 1, 1864, pp. 60-68.

fifty known wrecks had occurred, and by January 1, 1895, eighteen more had been added, two of them occurring during the summer of 1894, after my departure. A 'wreck-chart' of the island was prepared by Mr. S. D. Macdonald of Halifax in 1882, and published by the Department of Marine of the Dominion Government.¹ It has been revised up to 1890, but there are supposed to have been other unknown wrecks far out on the bars, of which there is no evidence save perhaps broken spars or a dead body flung by the breakers high on the sandy beach. Richly does Sable Island deserve the title 'An Ocean Graveyard,' and well has it been said, "No other island on this globe can show so appalling a record of shipwreck and disaster!"

One of the most fascinating pages in the history of the island, and one that certainly bears most directly upon the history of our Sparrow, is that which records its gradual demolition by storms and ocean currents. It is now apparently a question of years, not centuries, before the island becomes a submerged bar like those with which it is surrounded or those which extend out for miles from either end. There have been periods when it has melted away with startling rapidity, and then again others during which little or no change has taken place. The western extremity has suffered most, while the eastern has been little affected save perhaps by the fury of the gale that, drifting the sand before it, builds up or pulls down the miniature mountains with surprising rapidity. It has been thought that the whole island has been moving eastward grain by grain, but such a statement has not been fully substantiated. It is the western end and southern shore that have been steadily washing away, and the process goes on more rapidly, the smaller the island becomes, while there is little or no compensatory building up of the eastern end.

Its size prior to 1775 must remain a matter of conjecture. In that year, however, charts compiled from French sources show it to have been no less than forty miles in length and two and one quarter in breadth. In 1799 an Admiralty survey, carefully made, gave the island a length of thirty-one miles and a breadth of two. In 1808 a special survey of the island made it thirty miles in length and two in breadth, with hills from one hundred and fifty to two hundred feet in height, reaching their maximum elevation near the eastern end. In 1815 another chart shows the length to be only twenty-nine miles, and yet we learn that within the four years prior to 1814 no less than four miles of the western end had crumbled into the sea, as proved by the situation of the main station erected in 1801. It was then

¹ A facsimile of this map, together with an account of the island, may be found: J. M. Oxley, 'An Ocean Graveyard,' Scribner's Magazine, I, May, 1887, pp. 603-610.

five miles from the western end. Its removal was necessitated in 1814, in 1820, and in 1833, the sea advancing meantime eleven miles. A survey in 1829 gave a length of only twenty-two miles, while another in 1851 increased this to twenty-three, since which time no survey has been made. Two wooden lighthouses, one at either end, were erected in 1873, the distance between them in a direct line being twenty-one miles, with probably a mile or so of grass-covered hills beyond them at either extremity. In 1882 the sea undermined the western lighthouse, and it was hastily taken down and moved 1218 feet further eastward. In 1888 a second removal became necessary, and this time it was transported nearly two miles eastward (9100 feet S.E. by E., $\frac{1}{2}$ E.) to the site it now occupies. Meanwhile the sea has advanced to within about half a mile, and in a very few years will again threaten its destruction.

These figures are derived principally from one of Mr. Macdonald's interesting papers on Sable Island.¹ It will be observed that they are somewhat conflicting, but whether this is due to inaccuracies in the surveys, to the difficulty of determining exactly where the ends of the island are, or to an actual movement eastward of the sand, the fact remains that the island is far smaller than it was a century ago.

Regarding the history of the lagoon or lake which has always occupied a large portion of the island, I cannot do better than quote a few lines from the Rev. George Patterson's excellent and exhaustive paper,² where he says:—

The changes going on in the physical structure of the island appear further from what has taken place in the lake. Some time before the first government establishment was placed on the island there was an opening into it from the north. The superintendent, writing in 1808, says that 'it is completely shut, and it is difficult to trace where it has been.' The superintendent in 1826 mentions the same fact, but urges the reopening of it, which he thinks might be accomplished at moderate expense, in which case it would serve as a harbor of refuge for vessels of fifty tons. Some years after a terrific storm caused a similar opening from the south, through which small vessels entered for shelter, but in the year 1836 a similar storm filled it up again, inclosing two American vessels which had taken refuge within.

For some time after the formation of the government establishment on the island, this lake was fifteen miles long, and, though gradually becoming shoal from the material drifting into it, it afforded a very convenient means of transport by boat. The residents largely used it in conveying supplies to the east end, in bringing wood

¹ Trans. N. S. Inst. Nat. Sci., Vol. VI, pt. iv, 1886, pp. 110-119.

² Rev. George Patterson, 'Sable Island, its history and phenomena,' Trans. Royal Soc. Canada Sec. II, 1894, pp. 1-49.

from the same quarter, and wrecked materials to the main station. But during the winter of 1881 a severe gale opened a gulch near the east end, which has so drained it that it is now only eight miles long, and so shallow as to be useless for transport.

The destructive agency of the sea appears farther in the ridge which separates the lake from the sea on the south. Originally it was half a mile wide, with hills upwards of fifty feet in height, now it is a narrow beach, in some places not more than a hundred yards wide and so reduced in height that the sea breaks over it in stormy weather. Should this barrier be removed, the work of demolition will go on more rapidly than ever. (Pp. 43-44.)

The fragments of history here presented have been gathered from many sources, and selected with a view to showing the vicissitudes through which all animal life on the island must have passed. It now remains for me to describe the island as I found it in 1894.

PHYSICAL ASPECT OF SABLE ISLAND.

The geologists tell us Sable Island is either the remains of a sand continent of remote glacial origin or, more probably, a vast heap of glacial detritus brought from the north by the ice-floes of a more modern period and heaped up by existing ocean currents.¹ At all events, it now forms the ribbon-like crest of a submerged bank two hundred miles long by ninety in breadth, similar to those extending from Newfoundland to the shoals of Nantucket. A scant twenty miles of rolling sand-hills is all that remains today above the surface of the ocean, some of the sand mountains attaining an elevation of eighty feet and resembling in almost every particular save greater size the stretches of sand dunes to be found along our Atlantic seaboard,—the same treeless aspect, the same sparse covering of coarse beach-grass, the same deserts of shifting white sand. But on Sable Island in the hollows among the hills and often to their very summits, grasses grow luxuriantly in many places, and a large part is carpeted with the evergreen Crowberry (*Empetrum nigrum* L.) and Juniper (*Juniperus nana* Willd.) which are very characteristic productions. Between the two lighthouses it stretches in the form of a slender crescent, the concavity towards the Nova Scotia coast distant at its nearest point eighty-six geographical miles. The horns of the crescent extend at

¹ S. D. Macdonald, 'Sable Island, no. 3, its probable origin and submergence,' Trans. N. S. Inst. Nat. Sci., VI, pt. iv, 1886, 265-280.

either end in several parallel submerged bars a distance of fifteen miles or more, where vessels have been lost a dozen miles from the nearest land. About a mile of grassy sand-hills now intervenes between each light and the northeast and northwest bars respectively. The former dries for several miles at low tide in fine weather, but the latter only shows little patches of damp sand, the remains of what was once part of the island; and if you stand at the western extremity, the sand is actually eaten away from beneath your very feet by a swift current from the southeast. As far as the eye can reach, an imposing white line of breaking surf extends out on both the bars.

The greatest width of the island hardly anywhere exceeds a mile, and a lagoon called Lake Wallace, or simply 'the lake,' stretching along more than one half of its length, diminishes the land area of the western portion fully one half. The lake, at most a few hundred yards in width and very shallow, is separated from the ocean southward by a bare sand-bar over which the sea breaks in time of storm and through which it has forced two narrow inlets. As we have seen, not many years ago this 'south beach,' as it is called, was a substantial barrier of grassy sand-hillocks. Between the lake and the ocean northward intervenes a backbone of hillocks that increase in size eastward, until they culminate in a huge continuous bank. This maintains, almost without a break for six or eight miles, an elevation of sixty to eighty feet. Viewed in the fog it looms up like an important range of mountains, descending abruptly on the ocean side, and sloping more gradually into the central valleys of the island, which are blocked at every turn with lesser hills and diversified with numerous fresh-water ponds. A less impressive southern range of hills extends along the shore eastward from the foot of the lake. The wind has carved them into numberless peaks, and here as well as in many other places its resistless force is shown.

Once let a 'raw' spot (as it is aptly called) be found,—a break perhaps by hoofs of cattle in the grassy hillside,—and soon a hollow is whirled out that succeeding storms convert into a great gully or channel through the hills, over the steep sides of which hangs a feathery curtain of tangled roots and grass, vainly endeavoring to shield the edges from further injury. From one end to the other the island is a series of startling contrasts, verdure and sand desert going hand in hand. A single winter's storm may completely change the face of the landscape, spiriting away hillocks in this place, building up others in that, and spreading a thick blanket of sand over what was perhaps the fairest spot of all. This burying process produces the thin layers of vegetable mould that alternate in many places with the sand of which the soil is almost wholly composed. The sand consists chiefly of fine

rounded grains of white or transparent quartz, and no stones are found.¹ The beach is strewn with shells of many species, and its monotonous stretches are relieved by the ribs and other fragments of unfortunate vessels. Inland, the continuous areas of vegetation are much more extensive over the eastern half of the island than elsewhere; and evergreen shrubs almost entirely replace the turf-covered areas of its western part.

CLIMATE.

The climate of Sable Island is colder in summer and warmer in winter than its situation (East End Light, Lat. $43^{\circ} 58' 10''$ N., Long. $59^{\circ} 46' 20''$ W.; West End Light, Lat. $43^{\circ} 56' 40''$ N., Long. $60^{\circ} 6'$ W.)² would indicate. It lies in the cold Labrador current sweeping down from Baffin's Bay. Hence the cool summers; for Mr. Boutilier tells me there are only about twenty days in each year when the mercury goes above 70° F. and the highest recorded temperature in the last ten years has been 78.5° F. Proximity to the Gulf Stream tempers the winters, and only twice in the same period has the temperature been as low as 6° F., rarely reaching the single figure. Snow does not lie long, but wastes rapidly in the salt air. This same proximity to the Gulf Stream explains, too, the dense and frequent fogs that prevail at all seasons of the year. The warm, moisture-laden air of the Gulf Stream is carried by southerly breezes till it meets the cold atmosphere of the Labrador current, when a condensation of the aqueous vapor takes place, resulting in the fogs that often roll in, particularly in summer, as far as the Nova Scotia coast. I was informed that June and July were the months most to be dreaded, and that only a few years ago fog had prevailed at this time for nine consecutive weeks. I was more favored, and although there was fog of varying density almost every day of my stay, and occasional rain, the sun would sometimes struggle through for a few moments. Once or twice it shone brightly in the crisp air, a stiff westerly breeze driving the fog-banks out to sea, and dashing little waves upon the lagoon's shores until they were lined with snowy drifts of foam. It was a pretty sight, and large balls of the foam, diminishing in size as they sped, were chased along by the wind, leaving behind them queer white trails on the moist beach.

¹ Cf. S. D. Macdonald, 'Geological Notes,' Trans. N. S. Inst. Nat. Sci., Vol. V, pt. iv, 1882, pp. 337-339.

² From 'List of Lights and Fog-Signals on the coasts rivers and lakes of the Dominion of Canada. Corrected to 1st January, 1894.'

The extremes of temperature encountered by me were 60° F. on June 9 and 40° F. on June 13, and I can assure my readers that, with a temperature seldom over 50° F., winter clothing and an overcoat did not come amiss.

The violence of the wind and the fury of winter storms can only be estimated by the changed aspect of hill and valley after a long-continued gale. I encountered one when the wind attained a velocity of over fifty miles an hour, and I can now realize what it must have been on one occasion when for twenty-four hours the anemometer registered a rate of not less than sixty-four miles an hour, with bursts that reached eighty-seven.

FLORA.

It was impossible to study satisfactorily the flora of Sable Island, for at the time of my visit few of the plants had more than just opened their earliest buds, and of the species collected, many could not be positively identified even by so able a botanist as Dr. N. L. Britton of Columbia College, who was kind enough to make the attempt for me and to furnish the scientific names. The most abundant production is the Beach-grass (*Ammophila arcuaria* (L.)) which grows, just as it does on our sandy coasts, in tufts and patches all over the island, from the edges of the low bluffs undermined by the sea to the most inland ponds in the vicinity of which it mingles with other grasses, sedges and rushes. Some of these could be identified, as *Juncus balticus littoralis* Engelm. and *Juncoides campestre* (L.), but there are also some unrecognizable species of *Carex* and *Panicum*. Timothy (*Phleum pratense* L.) and Red-top Grass (*Agrostis alba vulgaris* With.), as well as Red Clover (*Trifolium pratense* L.), have been cultivated near the stations, and White Clover (*T. repens* L.) is frequently met with, but man's influence has been at work on the island for so many centuries that it is almost impossible to draw the line between indigenous species, if such there be, and those artificially introduced. Next to the Beach-grass, the heather-like, alpine Crowberry (*Empetrum nigrum* L.), with its black little berries, vies with the sturdier Juniper (*Juniperus nana* Willd.) in abundance. The thick, yielding carpet that these two prostrate evergreen shrubs spread over a large portion of the island does much to preserve it from the fierce attacks of the wind, and to soften the bleak and desolate aspect it might otherwise present. To walk or ride over this bed of matted boughs gives one the sensation of being upon heavy tapestry laid upon a rough and hummocky surface. The hills and valleys at the

eastern end of the island are so covered that when softened by a veil of fog the effect is not unlike that of the rolling prairie lands of the West. The Crowberry is the more abundant and the more generally distributed of the two species. Rose bushes, apparently *Rosa nitida* Willd., and blueberry bushes, apparently *Vaccinium pennsylvanicum* Lam., abound, especially in the vicinity of the little ponds, where all vegetation is more luxuriant and where late in the season great beds of roses are to be seen. Large numbers of Cranberries (*Schollera macrocarpa* (Ait.)) grow wild, and the yearly crop that is gathered amounts sometimes to several hundred barrells. From the trailing vines in the damp hollows among the hills the large and juicy berries of last year were still to be gathered at the time of my visit. The blueberry bushes were blossoming the second week in June, many of the tiny sprigs trailing in the sand, partly covered by it, and the leaf buds of the rose bushes were little more than half unfolded. Strawberries (*Fragaria canadensis* Michx.) grow in profusion, and the plants were in full blossom during my stay. The Partridgeberry (*Mitchella repens* L.), the Bunchberry (*Cornus canadensis* L.) and the Bayberry (*Myrica cerifera* L.) are also found.

No trees grow on Sable Island, and efforts to introduce them have proved futile. To be sure a stunted willow bush stands in the superintendent's dooryard, protected by a board fence, but each winter the icy winds nip the few shoots that dare to push above this shelter. All the bushes of every kind are much dwarfed, few of them reaching half way to the knee, but forming very dense clumps in sheltered situations. Frequently the clumps catch the drifting sand; grass, weeds, and moss soon find a foothold, and some day a turfy hummock is the result. This perhaps gradually extends its limits and joins its neighbor, and in the course of time the characteristic hummocky ground of certain parts of the island is formed. At the time of my arrival all looked bare and brown. Before my departure nearly the whole surface had acquired a visibly greener tinge with here and there the ruddy glow of blossoming Sorrel (*Rumex acetosella* L.), while such weeds as the Beach Pea (*Lathyrus maritimus* (L.)), Everlasting (*Gnaphalium* sp.?), and Meadow-rue (*Thalictrum* sp.?) were becoming conspicuous. Blue violets (*Viola obliqua* Hill) and white ones (*V. lanceolata* L.) were abundant, and many inconspicuous plants were pushing above the ground and unfolding their early buds or blossoms, the majority of them too young for accurate determination. This is to be regretted, for my specimens show that not less than forty species occur. Several mosses and lichens are found, among them a *Sphagnum*. Eel-grass (*Zostera marina* L.) abounds in the lagoon, and occurs as drift along its shores, associated with green filmy sheets of Sea Lettuce (*Ulva* sp.?) that soon become

dried and bleached. Rockweed (*Ascophyllum nodosum* (L.)), torn from its anchorage on some distant shore, is daily cast on the beach, but like some of the shells found there, of West Indian species, its appearance is quite accidental. There is one more plant that is worthy of mention, the Sandwort, as represented by *Arenaria peploides* L. and *A. granlandica* (Retz). It covers the dry bars, and among its shiny leaves, only a few inches high when I left, the Terns are fond of placing their nests. As for the "golden-rod, asters, and blue lilies" that are said to bloom later in the season, I failed to obtain any specimens. Some of the grasses are cut for hay, but it did not look as if the crop could be a very heavy one. Potatoes and a few other vegetables are raised, but successful farming in such sandy soil is out of the question, even if the summers were not so cold. I make no pretence to a complete enumeration of the plants of Sable Island, for reasons given, but those that I have mentioned are among the most conspicuous and characteristic of its flora, which resembles in many respects that of the adjacent mainland.

MAMMALS.

It is not within the scope of the present paper to enter into a discussion of the whole fauna¹ of the island, and I therefore pass at once to some of the higher groups. Of the mammals there is little to be said, for the once abundant Walrus (*Odobænnus rosmarus* (Linn.)) has long since been exterminated, and, with the exception of a couple of species of Seals, there are no mammals of any sort found there today, save those artificially introduced by man. Great numbers of the Harbor Seal (*Phoca vitulina* L.) are resident. They were in large herds or smaller groups, basking along the beach or disporting in the lake. At the time of my visit many of the new-born young were seen, and could be easily captured. Sometimes they were found straying inland, where they perished from hunger or from the dogs that delighted to worry them. When a herd was approached the old Seals would flounder down the beach into the water, leaving behind them a few of the mottled young either sound asleep or making no effort to escape. No great fear was shown by the adults, but they all evinced great curiosity, and they would follow me for considerable distances, swimming along with wide-opened eyes,

¹ Dr. Gilpin's pamphlet (1858) is the only treatise ever published that has attempted a sketch of the fauna and flora of Sable Island. To it is appended a list of thirty-eight species of mollusca by J. Willis.

their shiny black heads ranging into a semi-circle just beyond the breakers if I paused to watch them.

Occasionally I saw small groups of the larger Harp Seal (*Phoca groenlandica* Fabr.), the young of which are born on the bars in the month of January. I was shown the pure white skins of the young. They are found only in small numbers.

When we consider the probable origin of Sable Island, an up-building of grains of sand from the depths of the ocean, and the changes through which it has passed, the absence of mammals upon it is not surprising. The history of the absolute extermination, often directly or indirectly by the hand of man, at one period or another, of every introduced species including the domestic animals, is a striking fact. The life tenure of each has also depended on a limited food supply and the severity of the winters. Even the wild ponies, of which there are several hundred, succumb when their pastures are buried by sand-drift. Only last winter (1893-94) scores died rather than venture from under the protecting banks and face a long-continued storm. Sheep do not survive the winters. The extermination of the wild cattle and foxes that occupied the island in the seventeenth century has already been mentioned elsewhere. The wild swine were destroyed in 1814, because of their ghoulish propensities in times of wreck. Even the inhabitants themselves have occasionally been reduced to the extremity of eating horse flesh. There have been plagues of rats in consequence of the frequent wrecks. The stores of the first superintendent were so extensively demolished by these pests, that for a time he and his men were actually threatened with starvation. Rabbits, ordinary pet rabbits, were first introduced over fifty years ago, and apparently survived many years. It is said that about 1827 a Snowy Owl took up his abode on the island, feasting upon them and remaining throughout the summer. Towards 1880 some cats were turned loose, which fell upon the rabbits and rats and rapidly exterminated them. Shortly afterwards they themselves succumbed to winter hardships. In 1882 rabbits were again introduced, and became so abundant and such a nuisance that cats were again imported from Halifax to destroy them, seven in the summer of 1889 and thirty more in 1890. While the cats that survived the winter were still feasting upon the remnant of the rabbits, seven red foxes from the mainland were introduced in June, 1891, and in a single season they made an end of all the rabbits and the cats. The foxes have greatly multiplied, and are now exterminating the birds, sucking the eggs of the wild Ducks, and devouring the Terns which they catch at night on their nests. That the Ipswich Sparrow has been on the bill of fare of all these rats and cats and foxes (and prior to 1814, very likely, the wild swine) we can hardly doubt,—will it be spared their fate?

BIRDS.

The total number of species of birds breeding on Sable Island is ten, and in relative order of abundance they stand about as follows: *Sterna paradisæa*, *Sterna hirundo*, *Ægialitis semipalmata*, *Ammodramus princeps*, *Tringa minutilla*, *Ægialitis meloda circumcincta*, *Sterna dougalli*, *Merganser serrator*, *Anas obscura*, and *Actitis macularia*.

The sandy character of the island, with its lagoon and its bars, makes it a paradise for Terns, which are by far the most abundant and most conspicuous of its feathered inhabitants. These snowy and graceful birds hover thick as snowflakes over the level stretches of dry sand-bar where great colonies lay their eggs regardless of storms and tides that sometimes urge the heavy surf far beyond its usual bounds and sweep away eggs and young by the thousand. The eggs are excellent eating, and 'egg-picking,' as it is called, is systematically carried on by the life-saving crews for several weeks after the birds begin to lay. Finally everybody wearies of egg diet and the Terns are left to rear their young without further molestation from man. The 'egg-pickers' pass over the same ground nearly every day and spare such previously overlooked nests as chance to contain three eggs or more. I was told that, as the season advanced, the eggs became so much more plentiful that a smaller and smaller territory needed to be covered each time before the pails and baskets were filled to overflowing. Since foxes have been introduced the Terns have had a new and dangerous enemy, as attested by the numerous wings and feathers that lie about the fox burrows. It is to be hoped every effort will be made by the proper authorities to protect these birds from their worst enemy, man—or, to be more exact, in this case, woman,—for elsewhere along our Atlantic coast they have been wellnigh exterminated in order to furnish the strange headgear that Fashion thoughtlessly imposes.

Probably more than two thirds of the birds I saw were Arctic Terns, and a large portion of the other third Common Terns, with a goodly sprinkling of Roseates, the latter a species hardly to be expected so far northward and associated with such boreal species as the Least Sandpiper and Semipalmated Plover. A few individuals of the Arctic Terns were in the peculiarly striking plumage in which they were once described as the Portland Tern. Dissection showed that such birds were immature and not breeding. Rare indeed was the moment when a Tern was not somewhere in sight, and the incessant din of their cries was never out of my ears. Even during the midnight hours, when all was still and the distant undertone of the dashing sea seemed hushed, the sudden cry of a restless bird passing overhead

would be heard. The uproar occasioned by the invasion of their colonies was augmented by every bird within call of its fellow. Although the different species usually selected different parts of the beach for nesting grounds, the multitude of birds in the air seemed to preclude the proper identification of the eggs. But on Sable Island, just as I have found it to be elsewhere, and contrary to the statements of other observers, it is perfectly possible, with sufficient time at one's disposal, eventually to mark down individual birds on their nests and, when they are disturbed, to follow them with the eye throughout the mazes of the hovering hordes.

The presence of the Semipalmated Plover or Ringneck, breeding abundantly, was one of the many surprises that awaited me on this interesting island. The nearest locality at which it has recently been recorded as breeding is the Magdalen Islands in the Gulf of St. Lawrence.¹ However, Dr. Gilpin in 1858 wrote as follows: "Ringneck (*Charadrius Torticollis*) and Peeps (*Tringa minuta*) were breeding in numbers. . . ." "*Torticollis*," a curious confounding with 'wry-neck,' of course refers to two species, but the reference to the Least Sandpiper is certainly a valid record of fact. The nests of the Semipalmated Plover were little more than hollows in the sand, carelessly lined with a few scraps of eel-grass or bits of dry grass, and were placed, without the least attempt at concealment, in all kinds of places, the sandier, more barren situations being usually chosen. A favorite site was among the fringe of drift cast up on the shore of the lagoon, where the eggs harmonized marvelously with their surroundings, and were easily overlooked. The bird leaves the nest the moment an intruder is spied.

To my surprise, I find that there is no intimation by those who have met with this species in its northern haunts that it has any love song. As a matter of fact the male sings frequently and loudly, though not very musically. The liquid sweetness of the well-known call-note is lacking, and there is some suggestion of the *kow-kow* notes of the Black-billed Cuckoo. The song consists of a rather harsh, resonant *tschüp*, monotonously repeated over and over at the rate of about forty times per minute, and extending over a period of four or five minutes. During its execution the bird sweeps erratically hither and thither, near the ground, with slowly flapping wings that are momentarily held extended straight up above the body. The flight is most suggestive of that of the Nighthawk, and, like the song, it is not at all what one might expect from acquaintance with the birds during their migrations. On Sable Island they are known as 'Black Ringnecks,' to distinguish them from the 'White Ringnecks,' as the Belted Piping Plovers are called.

¹ Bishop, Auk, VI, 1889, 147.

The presence of the latter subspecies, heretofore considered a bird of the Northwest and straying only occasionally to the Atlantic coast, was another of Sable Island's surprises. They are outnumbered by the Semipalmated Plovers perhaps a hundred fold, but they are moderately abundant. They lay their eggs in hollows made in the sand, without any attempt at a nest. The eggs are like those of the ordinary Piping Plover (which bird I did not find on the island), finely speckled on a light ground, and quite unlike the eggs of the Semipalmated Plover, which are heavily spotted on a dark ground. The birds themselves, including the females, had the neck-ring of black complete and conspicuous. The question of distribution raised by these facts is an interesting one.

Another unexpected species found on Sable Island was the Least Sandpiper, although Dr. Gilpin mentions it back in 1858. Recent observers have found it breeding in Labrador, and doubtfully refer it to Newfoundland and the Magdalen Islands. On Sable Island it abounds, though far less abundant than the Semipalmated Plover, and unlike the latter confines itself to the turf stretches adjacent to the inland ponds. This is another water-bird whose love song has never been mentioned by those who seem to have been well acquainted with the species in its northern haunts. This is all the more surprising, inasmuch as the song is striking — quite musical in fact, and more metallic than that of the Semipalmated Plover, which, however, it resembles in monotonous repetition. It, too, is delivered on the wing, but the flight of the little Sandpiper is quite different. He poises often high in air with a series of rapid flaps of the wings, followed by a soaring forward (never in circles) while the wings are stiffly set for a few moments. The flight of the Meadowlark, or of the Spotted Sandpiper, is suggested. Meanwhile the song, consisting of two rapidly repeated syllables, the inflection rising, and the emphasis falling on the second, continues to vibrate in the air. The intonation is very like that of the spring note of the common toad, and the couplet *tōō-āw'* is repeated one hundred and thirty times every minute. As the length of the whole performance is usually about ten minutes without any break, the monotony of such a song is very obvious, although it blended pleasantly with the harsh cries of the ever-present Terns and had a silvery tinkle about it when heard off in the drifting fog. At its close the performer would glide to the ground with the low, cheerful chuckle that is familiar to us during the migration, and perhaps scamper away with his mate along the margin of some sandy pool. The nest is placed in the dry turf where there is actually not enough grass to conceal a croquet-ball, and the males assist in incubating the eggs which are so extraordinarily large for the size of the birds. They sit on the nests until fairly

trodden upon, and then tumble along over the ground, as if injured, to divert your attention from their treasures, which stand very nearly on their pointed ends in the deep cup prepared for them. The birds are tame and certainly deserve the pleasing accounts that have been written of them by Audubon, Nuttall, Dr. Coues, and others.

Of the two species of Ducks that are summer residents on the island, the Red-breasted Merganser is the more abundant, although both are much diminished in numbers compared with what they used to be, and the foxes are now making sad havoc with the handful that remains. Dr. Gilpin mentions "Black Duck (*Anas obscura*) and the Shell Drake (Merganser)." Where a Duck can be seen sitting on her nest in an exposed situation, as is often the case, the foxes do not have to search for them, and it is only some of the nests hidden away in the brier-patches that can possibly escape.

The rarest of the summer residents is the Spotted Sandpiper, for I knew of but two pairs on the island.

I have now enumerated, with the exception of the Ipswich Sparrow, all the birds that breed, but there are many other visitors. I used to see almost daily a flock of Kittiwake Gulls (*Rissa tridactyla*), but dissection of specimens showed that there were no signs whatever of breeding. Occasionally single birds or even flocks of the Herring and Great Black-backed Gulls (*Larus argentatus smithsonianus* and *L. marinus*) were seen, and on foggy nights Petrels (*Occanodroma leucorhoa*) used to come about the lighthouses in numbers, following their nocturnal proclivities, and wandering doubtless from their burrows on the Nova Scotia coast. A few dusky Jaegers ('Gull Chasers' or 'Bos'ns,' as they are called) were sometimes seen far out over the bars. The only specimen I obtained was a bleached and mummified carcass of *Stercorarius parasiticus* that had washed up on the beach. During the early days of my stay a few belated migrants, chiefly Warblers, played at hide and seek about the barns and woodpiles, wondering perhaps how they had got into a country so devoid of sheltering trees and bushes. Soon they all disappeared, and it was later when waifs from the mainland (such for instance as *Junco hyemalis*, *Empidonax flaviventris*, *Chætura pelagica*, and others) made their appearance, possibly losing their way in the fog or drifted along by the wind. After loitering for a few days they, too, would disappear, to be replaced later by other waifs. I was informed that in the spring few Shore-birds or Ducks visit the island, and that in the autumn they are not as abundant as the situation of the island would seem to promise.

If now I have been successful in placing before my readers a rough picture of the island home of the Ipswich Sparrow, they will better appreciate the historical sketch and life-history of the bird which I am about to present, prefacing the same with the necessary synonymy and descriptions.

SYNONYMY.

Ammodramus princeps (Maynard).

IPSWICH SPARROW.

Centronyx bairdii, MAYNARD, Am. Nat. III, 554, 1869 (original notice of supposed occurrence of *Centronyx bairdii* in Massachusetts, the bird proving to be a new species, *Ammodramus princeps*); Nat. Guide, 112, frontisp., 1870 (original description and woodcut of the supposed *C. bairdii*).—ALLEN, Am. Nat. III, 513, 631, 1869–70 (further notice of same).—SAMUELS, Bds. New Engl. 581, 1870 (reference to same); N. and E. Bds. 581, 1883 (= Bds. New Engl., 1870, retitled).—BREWSTER, Am. Nat. VI, 307, 1872 (two additional specimens from Massachusetts).—COUES, Key, 135, 352, 1872.

Passerculus princeps, MAYNARD, Am. Nat. VI, 637, 1872 (explanation of error, and the supposed *C. bairdii* named *Passerculus princeps*); Nat. Guide, 2d. ed., 112, 1877 (colored plate, text revised); Bds. Florida, pt. iv, 101, 1878 (good general account, colored plate); Bds. E. N. Am. 101, 1881 (= Bds. Florida, 1878, retitled).—COUES, Key, 352, 1872; Am. Nat. VII, 696, 1873 (brief references to the early captures); Check-List, 31, 1873; Field Orn. (part 2, Check-List), 31, 1874 (= reprint of 1873 Check-List); Bull. N. O. C. III, 1, 1878 (synonymy, bibliography); Check-List, 2d. ed., 52, 160, 1882; Key, 2d. ed., 361, 1884.—BAIRD, BREW. and RIDGW. Hist. N. Am. Bds. I, 533, 540, pl. 25, f. 2, 1874 (general account, with description and colored plate of head).—BREWER, Proc. Bost. Soc. Nat. Hist. XVII, 441, 1875 (New England); *ibid.* XIX, 305, 1878 (further records); *ibid.* XX, 270, 1879 (references).—BROWN, Rod and Gun, VI, 81, 1875 (Maine); Bull. N. O. C. II, 27, 1877 (New Hampshire, doubtful); Lippincott's Mag. XXIII, 622, 1879 (woodcut, Maine); Bull. N. O. C. VII, 190, 1882; Proc. Portl. Soc. Nat. Hist., 13, 1882.—BREWSTER, Bull. N. O. C. I, 18, 1876 (New England); *ibid.* 52, 1876 (New Brunswick); Proc. Bost. Soc. N. H. XXII, 374, 1883 (not found on Magdalen Islands).—JORDAN, Man. Verteb., 84, 1876.—MERRIAM, Bull. N. O. C. I, 52, 1876 (Connecticut); Trans. Conn. Acad. IV, pt. ii, 36, 1877; Auk, I, 390, 1884 (Sable Island, Nova Scotia, probably breeding).—BAILEY, Bull. N. O. C. II, 78, 1877 (New York).—GIEBEL, Thes. Orn. III, 38, 1877 (placed in *Zonotrichia*).—MINOT, Bds. New Engl., 195, 1877 (general account); *ibid.* 2d. ed. (Brewster), 201, 1895.—ALLEN, Bull. Essex Inst., X, 16, 1878 (Massachusetts).—N. T. LAWRENCE, F. and S., X, 235, 1878 (early captures, New Jersey); Bull. N. O. C. III, 102, 1878 (= previous record).—W. A. JEFFRIES, Bull. N. O. C. IV, 103, 1879 (habits, comparison of plumage with *A. s. savanna*).—ABBOTT, F. and S. XIV, 44, 1880 (New Jersey).—RIDGWAY, Proc. U. S. Nat. Mus. III, 178, 217, 1880; *ibid.* IV, 211, 1881; Auk, I, 292, 1884 (supposed eggs from Sable Island, N. S.).—WOOLSEY, Bull. N. O. C. V, 121, 1880 (Connecticut).—SCOTT, Bull. N. O. C. VI, 116, 1881 (New Jersey).—STEARNS, New Engl. Bd. Life, I, 235, 1881.—CHAMBERLAIN, Bull. N. H. Soc. N. Bruns. I, 38, 1882 (= Brewster, Bull. N. O. C. 52, 1876); Bull. N. O. C. VIII, 8, 1883 (flock); Bull. N. H. Soc. N. Bruns. II, 40, 1883 (= previous record).—INGERSOLL, Birds'-Nesting, 93, 1882 (nidification unknown).—DUTCHER, O. and O. VIII, 48,

1883 (New York); Auk, I, 31, 1884 (= previous record); *ibid.* II, 36, 1885 (many specimens from Long Island, N. Y.).—GRIFFING, O. and O. VIII, 22, 1883 (New York).—SMITH, F. and S. XIX, 466, 1883 (Maine, rare in spring).—LANGILLE, Bds. E. N. Am., 199, 1884 (mere mention).—BISHOP, O. and O. X, 30, 1885 (Connecticut).—DWIGHT, Auk, II, 105, 1885 (Delaware).

Passerculus maynardi, BAIRD, BREW. and RIDGW., Hist. N. Am. Bds. I, 541, 1874 (*lapsus pennæ* in text).

Zonotrichia princeps, GIEBEL, Thes. Orn. III, 38, 772, 1877 (*Passerculus* a synonym of *Zonotrichia*).

Ammodramus princeps, RIDGWAY, Proc. U. S. Nat. Mus. VIII, 354, 1885 (placed in genus *Ammodramus*); Man. N. Am. Bds., 407, 1887.—ALLEN, Bull. Amer. Mus., I, no. 7, 251, 1886; Auk, X, 126, 1893 (faunal relations).—A. O. U., Check-List, 265, 1886; *ibid.* abridged ed., 48, 1889.—DUTCHER, Auk, III, 441, 1886 (distribution, food); F. and S., XXXIV, 206, 1890.—JONES, Auk, III, 135, 1886 (Nova Scotia mainland in spring).—SENNETT, Auk, III, 135, 1886 (Texas, probable error in label).—CHAMBERLAIN, Cat. Canad. Bds., 85, 1887 (New Brunswick, Nova Scotia); Table Canad. Bds., 10, 1888; Ornith. U. S. and Can. (revis. Nuttall's Man.) I, 326, 1891 (brief mention).—COOKE, Migrat. Miss. Valley, 188, 1888 (occurrence in Texas doubted).—JORDAN, Man. Verteb. 5th ed. 286, 1888.—SHARPE, Cat. Passerif. pt. III, 679, 1888 (synonymy, description).—BISHOP, Auk, VI, 199, 1889.—BROWN, Proc. Portl. Soc. 39, 1889.—DAVIE, Nests and Eggs, 3d ed. 298, 1889 (=, practically, Ridgw. Auk, 1884).—MAYNARD, Eggs N. Am. Bds. 104, 1890 (authenticated eggs unknown).—J. NELSON, Geol. Surv. N. J. II, 541, 1890.—RIVES, Proc. Newport Soc. N. H., Doc. VII, 73, 1890 (Virginia).—WORTHINGTON, Auk, VII, 211, 1890 (Georgia).—AVERILL, Bridgeport Sci. Soc. 14, 1892 (Connecticut, rare).—LAURENT, O. and O. XVII, 88, 1892 (New Jersey).—STONE, Auk, IX, 204, 1892; Bds. E. Penn. and N. J. 112, 1894 (New Jersey, winter resident).—APGAR, Key. 28, 1893.—BREWSTER, Auk, X, 302, 1893 (= Worthington, 1890); *ibid.*, X, 365.—CHAPMAN, Bds. Vicin. N. Y. City, 59, 1894 (winter resident); Handb. Bds. East. N. A. 291, 1895.—WRIGHT, Bird-craft, 146, 1895.

Large Barren Ground Sparrow, Ipswich Sparrow, Pallid Sparrow, Maynard's Sparrow, Ipswich Savanna Sparrow, of authors.

HABITAT.

Sable Island, Nova Scotia, partly resident. In migration confined closely to the seacoast southward, wintering casually in New England, more abundantly from New York to Virginia, and occasionally reaching Georgia.

DESCRIPTIONS.

Male and female in breeding plumage.—Top of head sepia brown¹ with darker streaking and a median ashy white line; rest of upper parts ashy or smoke gray, most pronounced on the nape, obscurely streaked on the neck and rump, broadly

¹ Ridgway's nomenclature of colors is used in these descriptions.

striped on the back and upper tail coverts with deep brown. Each feather (including the scapularies, the tertiaries and most of the wing coverts) is centrally clove brown, merging into an outer zone of sepia or vandyke, broadly edged (narrowly on the crown) with gray which, on the inner webs of the median feathers of the crown, on the back, and on the tertiaries, becomes conspicuously ashy white and forms two obscure wing-bars at the tips of the greater and median coverts. The coverts and the outer webs of the scapularies, tertiaries and secondaries, are tinged with pale russet. Quill-feathers of the wings and tail deep hair brown above, paler below, the two outer rectrices slightly paler than the rest, the shafts lighter colored, the webs (chiefly the outer) narrowly edged with ashy white. Under parts white, streaked rather broadly with brown along the sides from the bill to the tail and on the breast, giving the effect of spotting when the plumage is disarranged. The individual feathers have central linear spots of clove brown that merge into narrow zones of russet-tinged vandyke. A conspicuously dark, submalar streak is continued along the sides in two fairly definite lines that are supplemented by others on the breast, where they aggregate into an obscure central blotch, the entire inner web of some of the median feathers being of a rusty brown. The chin and jugulum are immaculate and, together with a malar stripe, broadening posteriorly, are pure white. A dark brown rictal streak curves upward towards a paler postocular line. The auriculars are ashy or brown-tinged; the lores paler. A broad superciliary line is canary yellow, becoming ashy posteriorly. The orbital ring is whitish, more or less tinged with yellow. Lining of wing and longer under tail coverts (the shorter are entirely white and conceal the others) white with dusky shaft streaks. Bend of wing tinged with yellow, which sometimes also suffuses the lesser external coverts. Tibiæ pale vandyke. Legs, in fresh specimen, yellowish or brownish flesh-color, fading in time to a pale yellowish buff. Feet darker, especially at the joints. Bill in fresh specimens: upper mandible bluish black, grayish or yellowish along posterior two thirds of the edge, fading in time to a blackish brown; lower mandible bluish gray at tip, becoming a pale flesh brown posteriorly, and flesh-color at the base, fading in time to a yellowish buff. Iris deep hazel brown. The sexes are alike in plumage differing only in relative size.

During the breeding season, the plumage becoming much abraded, the pale edgings of the feathers are lost to such an extent that the birds, instead of appearing, like most species, paler and faded, are really darker, and the streakings are sharper, than at any other season of the year. The yellow over the eye, acquired late in the spring moult, is equally intense in both sexes, although the individual intensity is variable. The feathers of the lower parts are white only at their extremities, and if disarranged easily show the mouse-gray of their proximal portion.

Adults in autumn. Above hoary, even grayer than in spring dress, owing to the broad ashy edgings of the feathers. The russet on the wings is a little more pronounced, the vandyke zone of the dorsal feathers is broader, and the superciliary line is ashy white or only faintly tinged with yellow. Beneath, a slight buffy cast prevails except on the chin, abdomen, and lower tail coverts, and the streakings are suffused, and paler and rustier than in spring. This effect is due largely to a wider zone of the vandyke and to the long, veiling, white margins of the feathers.

Young of the year. Differs from the adult in the brownish, rather than grayish, tints above, in the richer, deeper russet on the wings, and in the decided buffy wash that suffuses the head, the neck, and the under parts. This buffiness is most marked on the sides and breast, and it strongly tinges the malar stripe and auriculars.

Young in first plumage. (♂, juv., No. 3870, collection of J. Dwight, Jr., Sable Island, Nova Scotia, August 25, 1894.) Top of head, neck and rump, yellowish buff, tinged with ochraceous, and streaked narrowly with deep clove brown. An indistinct median stripe on the crown is pale buff. Back and upper tail coverts buffy or ashy, broadly striped with deep clove brown. Each feather has a large median, almost black, elliptical spot that merges into a narrow zone of buff broadly edged with ashy white. The scapularies are partly edged with vandyke instead of buff, thus producing two lateral brown stripes. Quill-feathers of the wings and tail, clove brown, edged, chiefly on the outer webs, with pale cinnamon brown which becomes broader and richer on the long tertiaries, while the margins of the first primary, the short tertiaries, and the greater and median coverts, are conspicuously ashy white, forming on the coverts two obscure wing-bars. The median coverts are dusky and show little or no cinnamon. Beneath, pale yellowish buff, nearly white on chin, abdomen, and under tail coverts; streaked, as in the adult, on the sides and breast with deep clove brown, almost black. Rictal and postocular streaks strongly tinged with vandyke. Auriculars pale ochraceous buff, forming a distinct spot on the side of the head; lores dusky. Superciliary stripe ashy gray. Tibiæ pale cinnamon. Legs, feet, and bill similar to those of the adult, but somewhat paler.

The relatively larger size and paler coloration of this species readily distinguish it in all plumages from *A. sandwichensis savanna*, the average female being about the size of the male *savanna*. The superficial resemblance to certain pale Western birds referable to *A. s. alaudinus*, is in a few cases rather striking. The first plumage of *savanna* is everywhere darker than that of *princeps*, having a deep ochraceous instead of a buffy cast, while the margins of the tertiaries and secondaries are a deep cinnamon, almost chestnut, and the streakings are somewhat heavier.

Measurements of 50 males: Length¹ 156 (150-159); extent¹ 257 (253-262); wing 76 (73-79); tail 58.5 (55-62); tarsus 22.5 (21.5-24.5); middle toe 17.4 (16.5-18); claw of middle toe 5.1 (4-6); bill, chord of exposed culmen, 11 (10-12.5); bill from nostril, 8.5 (7.5-9.5); depth of bill at nostril 5.9 (5-6.5).

Measurements of 50 females: Length² 149 (142-159); extent² 241.3 (234-248); wing 71 (67-74); tail 55.4 (52-59); tarsus 21.5 (20-23); middle toe 16.7 (15.5-18); claw of middle toe 5 (3.5-6); bill, chord of exposed culmen, 10.7 (10-11.5); bill from nostril 8.2 (7-9); depth of bill at nostril 5.5 (5-6).³

¹ Nine specimens only.

² Sixteen specimens only.

³ Average measurements in inches, of the above specimens, are as follows:—

♂: Length 6.14; extent 10.11; wing 2.99; tail 2.30; tarsus .89; middle toe .68; claw of middle toe 20; bill, chord of exposed culmen, .44, from nostril .33, depth at nostril .23.

♀: Length 5.87; extent 9.50; wing 2.79; tail 2.18; tarsus .85; middle toe .66; claw of middle toe 20; bill, chord of exposed culmen, .42, from nostril .32, depth at nostril .22.

HISTORY OF THE IPSWICH SPARROW.

Before intruding upon the Ipswich Sparrow in the privacy it has enjoyed for so many years on its island home, it is worth our while to glean from published records such information as has been current regarding an imperfectly known species.

Inasmuch as I have found it to be the only resident bird upon Sable Island, it is interesting to note in passing that as early as 1858, Dr. Gilpin in a pamphlet upon the natural history of the island¹ said "A little brown sparrow (*Fringilla*) also summered and wintered there." While this is undoubtedly a reference to the Ipswich Sparrow, his importance was not recognized, nor did he appear as a scientific fact until Mr. Maynard in the 'American Naturalist' for December, 1869, (p. 554) thus introduced him, under another bird's name, to the zoölogical world: "On Dec. 4th, 1868, I shot a sparrow that was new to me, on the sand-hills at Ipswich. Through the kindness of Prof. S. F. Baird, of the Smithsonian Institution, to whom I sent it for comparison with the *only extant specimen* of the *Centronyx Bairdii* (which is owned by him), it has been proved identical with that collected by Audubon in 1843 on the banks of the Yellowstone River, in the far West. My specimen differs somewhat in size and general coloration from Prof. Baird's. A detailed description, and the comparative measurements of the two specimens will be given in a work about to be published, entitled 'A Guide to Naturalists in collecting and preserving objects of Natural History,' which will also contain a complete list of the birds of Eastern Massachusetts, with critical notes and remarks relative to the localities in which some of the rarer species occur. A life-sized engraving of the *Centronyx* captured at Ipswich will also be given."

In justice to Prof. Baird, it may be here stated that at that time there was but one worn and faded specimen of Baird's Sparrow, taken nearly thirty years before, with which to make comparison. The two species really resemble one another but very slightly. In the same number of the 'American Naturalist' (p. 513) Dr. J. A. Allen refers to the Ipswich specimen at the beginning of his 'Notes on Some of the Rarer Birds of Massachusetts,' a full account following in February, 1870, (p. 631) under '*Centronyx Bairdii*' of his list. During the year 1870 Mr. Maynard's 'Naturalists' Guide' was published, containing a wood-cut and original description of the supposed Baird's Sparrow (p. 112). As this really applies to *Ammodramus princeps*, I take the liberty of quoting the article almost entire:—

¹ For exact references to this, and to succeeding papers quoted, reference should be made to the bibliography appended at page 43.

75. *Centronyx Bairdii*, BAIRD.—*Baird's Sparrow*. It is with pleasure that I add this unique sparrow to the Catalogue of the Birds of Eastern Massachusetts. Previous to the capture of this there was but one specimen extant, which was one of the original birds captured by Audubon upon the banks of the Yellowstone River, July 26, 1843. My specimen, through the kindness of Professor S. F. Baird, has been compared with the original, which is in his possession, and pronounced identical; but as mine differs somewhat from his, I have thought best to give a description of it here.*

Centronyx Bairdii, BAIRD.—*Baird's Sparrow*.

(See Frontispiece.†)

Emberiza Bairdii. AUD., Birds America, VII, 1843; Pl. 500.

Coturniculus Bairdii. BON. SYN. 1850, 481.

Centronyx Bairdii. BAIRD, Birds N. Am. 1858, 441.

SP. CH.—Back grayish; the middle of the feathers having a black centre edged with rufous. Top of head streaked with dusky and pale rufous, divided by a broad stripe of pale yellowish white. There is also a whitish superciliary stripe extending from the base of the bill to the back of the head. Ear-coverts grayish, with a rufous tinge. Quills brownish, edged with white on the outer web; scapularies, secondaries, and wing-coverts brownish black, edged broadly with rufous, brightest on the secondaries; scapularies also edged narrowly with white; the ends of both rows of wing-coverts narrowly tipped with white, forming two rather indistinct bars across the wings. Tail brownish, with the tips of the feathers and terminal half of the outer web of the outer tail-feathers pale yellowish white; the rest of the tail-feathers narrowly edged with the same. Under parts, including under tail-coverts, pure white. Feathers of the sides of the throat, with a broad band across the breast and sides, streaked with rufous, with dusky centres. The throat is indistinctly spotted with dusky. A triangular spot on the sides of the neck, below the ear-coverts, pale buff; ears dusky. Bill dark brown, with base of the under mandible paler. Eyes and feet brown.

Differs from *Pooecetes gramineus*, which in general form it resembles, in having a central stripe on the head, and a general rufous appearance, also in having longer tarsi, toes, and claws. With *Passerculus savanna* it cannot justly be compared, as it is much larger, and has a shorter and more obtuse bill. Indeed, so nearly does it resemble the *P. gramineus*, that amateur ornithologists to whom I have shown it have unhesitatingly pronounced it to be that species.

* "It differs in color just as clear autumnal birds differ from worn breeding ones,—tints paler, markings more suffused, etc. The stripe along the top of head is paler, not as fulvous as in the type; but in all essential points it seems to be the same bird."—Professor S. F. Baird, in Epist.

† The convexity of the upper mandible is somewhat exaggerated in the plate.

I give the comparative measurements of the two specimens, remarking that Professor Baird's was made from the dried skin, while mine was taken from the fresh bird.¹

The Ipswich Sand-hills, where the specimen was procured, is a most peculiar place. I never have met with its equal anywhere. Years ago these Sand-hills, which are three miles long by three fourths of a mile across, and contain about one thousand acres, were covered with a thick growth of pine-trees. Protected by these trees, and among them, dwelt a tribe of Indians, whose earlier presence is indicated, not only by tradition, but by numerous shell heaps scattered over the Sand-hills at irregular intervals. Indeed, even now the ashes of camp-fires may be seen, apparently fresh. Upon the advent of the white man, the usual event transpired, namely, the disappearance of the trees; and today, with the exception of a few scattering ones at the southeasterly corner, near the house of the proprietor of the Sand-hills, Mr. George Woodbury, not a tree is to be seen. All is bleak and barren. The surface of the ground, once covered with a slight deposit of soil, has become a mass of shifting sands. Many times has the present owner had cause to regret the want of foresight in his ancestors in removing the trees, as the several acres of arable land around the house are now covered with sand, including a valuable apple-orchard. Upon this orchard the sand has drifted to the depth of thirty feet. Some of the trees present the curious phenomenon of apples growing upon limbs that protrude a few feet only above the sand, while the trunk and lower branches are buried! The Sand-hills, in places, are covered with a sparse growth of coarse grass, upon the seeds of which, as I have remarked elsewhere, thousands of Snow Buntings feed. There are, in some places, sinks or depressions with the level of the sea. In these sinks, which, except during the summer months, are filled with fresh water, a more luxuriant growth of grass appears. Walking, on December 4, 1868, near one of these places, in search of Lapland Longspurs, I started a Sparrow from out the tall grass, which flew wildly and alighted again a few rods away. I approached the spot, surprised at seeing a Sparrow at this late day so far north, especially in so bleak a place. After some trouble I again started it. It flew wildly as before, when I fired, and was fortunate enough to secure it. It proved to be Baird's Sparrow. When I found I had taken a specimen which I had never seen before, — although at that time I did not know its name or the interest attached to it, — I instantly went in search of more. After a time I succeeded in starting another. This one, however, rose too far off for gunshot, and I did not secure it. It flew away to a great distance, when I lost sight of it. After this I thought that among the myriads of Snow Buntings that continually rose a short distance from me I again detected it, but I was perhaps mistaken. I am confident of having seen it in previous years at this place, earlier in the season.

* * * * *

¹The comparative measurements (in inches) of the two birds are given as follows by Mr. Maynard:—

	<i>Length</i>	<i>Wing</i>	<i>Tail</i>	<i>Bill above</i>	<i>Bill along gape</i>	<i>Tarsus</i>	<i>Middle toe and claw</i>	<i>Hind toe and claw</i>
Nebraska bird,	4.64	2.77	2.10	0.49	0.50	0.84	0.91	0.72
Massachusetts bird,	6.30	3.25	2.60	0.45	0.52	0.95	1.05	0.72

I think it more probable that the birds which occur at Ipswich are winter visitors from the north, than that they are stragglers from so great a distance as Nebraska. As might be expected, I heard no song-note at this season, but simply a short chirp of alarm.¹

In 1872 Mr. William Brewster recorded the following captures: "Mr. Maynard also informs me that he took two more specimens of Baird's Sparrow (*Centronyx Bairdii*), October 14th and 15th [1870], on the Ipswich sand-hills, thereby confirming the hypothesis advanced by him in the 'Naturalists' Guide,' namely, that they are regular winter visitants from the North." The capture of these additional specimens led to the discovery by Mr. Maynard that they were of a new species, and towards the end of the year 1872, in the 'American Naturalist' for October (p. 637), the original error was corrected by him, and the Ipswich Sparrow was established as a new species in the following words:—

In December, 1868, I took a Sparrow at Ipswich which was then supposed to be *Centronyx Bairdii*. In the autumn of 1870, I took two more of the same species, also at Ipswich; but upon visiting the Smithsonian Institution this spring and comparing these specimens with the original *C. Bairdii*, I have come to the conclusion that they are specifically distinct. They are closely allied to the savanna sparrow and evidently belong to the same genus; I therefore propose to name the Massachusetts bird *Passerculus princeps*, the large barren ground sparrow. The *Centronyx Bairdii* should also, I think, be referred to the genus *Passerculus*, for I can see no good generic character by which it can be separated. A description and figure of this new *Passerculus* will be found in the 'Naturalists' Guide' (page 112), under the name of *Centronyx Bairdii*, with a history of the capture of the first specimen and also an account of how this name came to be applied to it. It will likewise be understood that the name of *Centronyx Bairdii*, given in a notice in the May number of the NATURALIST (page 307) by Mr. Brewster, should read *Passerculus princeps*.

Dr. Coues in his 'Key,' published in 1872, under '*Centronyx bairdii*,' hinted at "something not now anticipated," and in the appendix recognized "*P. princeps* MAYNARD," saying, "Although perfectly aware of this at time of writing, I refrained from anticipating publication of the fact." From this time on, published references to the new species followed in rapid succession, and it may be of interest to look at the first records for the different States and Provinces. Arranged in sequence of publication, they are as follows:—

¹In the second edition, 1877, of the 'Guide,' Mr. Maynard, in the new light thrown upon the species, modified some of these statements to suit the species to which they really referred, and there is substituted for the original wood-cut a very fair hand-colored plate of the Ipswich Sparrow under its proper name.

- Massachusetts.—Ipswich, December 4, 1868. Maynard, *Am. Nat.* III, December, 1869, 554.
- Maine.—Cape Elizabeth, March 20, 1875. Brown, *Rod and Gun*, VI, May 8, 1875, 81.
- New Brunswick.—Point Lepreaux, April 11, 1876. Brewster, *Bull. Nutt. Ornith. Club*, I, July, 1876, 52.
- Connecticut.—‘South End,’ New Haven, November 4, 1875. Merriam, *Bull. Nutt. Ornith. Club*, I, July, 1876, 52.
- [?New Hampshire.—Lake Umbagog, October 9, 1876. Brown, *Bull. Nutt. Ornith. Club*, II, January, 1877, 27.]
- New York.—Coney Island, Long Island, December 20, 1876. Bailey, *Bull. Nutt. Ornith. Club*, II, July, 1877, 78.
- Nova Scotia.—Sable Island, summer of 1884. Merriam, *Auk*, I, October, 1884, 390.
- Delaware.—Rehoboth Beach, November 22, 1884. Dwight, *Auk*, II, January, 1885, 105.
- Rhode Island.—Point Judith, November 27, 1884. [Jencks,] *Random Notes*, II, March, 1885, 17.
- [?Texas.—Dallas, December 10, 1884. Sennett, *Auk*, III, January, 1886, 135.]
- Virginia.—Cobb’s Island, “common in winter.” Rives, *Proc. Newport Nat. Hist. Soc.*, 1889–90, 73.
- Georgia.—‘Jack’s Bank,’ Glynn County, January 8, 1890. Worthington, *Auk*, VII, April, 1890, 211.

Two of these records are open to such grave doubt that it is worth our while to examine the evidence on which they rest. The first is the one for New Hampshire by Mr. Brown who writes: “On the 9th of October, 1876, I met with one of these birds on a sandy point on the northwest shore of Lake Umbagog, in New Hampshire. I should hesitate to record the occurrence of this species in a locality so far removed from its known haunts, it not having been before observed so far in the interior, since, from the miss-fire of two cartridges in succession I failed to capture my bird, were I not perfectly acquainted with its almost unmistakable habits.” Unfortunately, its habits do *not* distinguish it from the Savanna Sparrow, which under certain conditions of light might easily be confounded with it. Besides, it confines itself so exclusively to the seacoast that its appearance so far inland under any circumstances would be highly exceptional. It is safer, therefore, to apply rigidly the too often slighted rule that the capture of a specimen, especially where there is room for doubt, shall be the accepted evidence of its occurrence, and thus exclude the sole record for the State.

The species has been recorded as a bird of Texas by Mr. Sennett, as follows: “I have in my collection an adult male *Ammodramus princeps* taken at Dallas, Texas, Dec. 10, 1884. I obtained it from Mr. Fred. T. Jencks of Providence, who writes me in regard to it as follows: ‘The

Ipswich Sparrow was purchased from the collector, Mr. Clothrie [it should be Clothier] Pierce, for a Western Grass Finch, and it was so labelled until the day I picked out your series of Sparrows, when I detected its true identity.' This largely extends the habitat of this comparatively new species, heretofore only recognized on the sand hills of the Atlantic Coast." A couple of years later this record was challenged in Cooke's 'Bird Migration in the Mississippi Valley' (p. 188), where it is stated "there is reason to suspect that the specimen really came from the coast of New England, the error having arisen from a transposition of labels." I have carefully examined the specimen, and investigated its history as far as possible. It is apparently a female *princeps*, judging by size (not a male as the label indicates), although it certainly resembles quite closely one or two extremely pale *male* specimens of the Western Savanna Sparrow occurring among some two hundred examined. Now, Mr. Pierce's labels were ordinary tags, and they were notoriously loosely tied. Many came off entirely, and his lot of birds from Texas is said to have lain in the drawers of one New England dealer before it passed into the hands of another from whom Mr. Sennett obtained the specimen. Dealers are fallible, even with the best of intentions. A loose Texas label accidentally attached to an unlabelled Ipswich Sparrow, of which there were said to have been a number in near proximity, is a far more plausible explanation than to assume that an Ipswich Sparrow was found two hundred and fifty miles from the seacoast and over one thousand from the nearest, and most southern, point from which it has ever been recorded. Of course with wings such an excursion is not impossible, but it is scarcely conceivable that a northern, coast-frequenting species would make such a trip for pleasure, while a storm theory is hardly tenable, because storms carry our birds northward and eastward, not southward and westward.

Resuming again the history of the species at the point where we digressed, we find Mr. Brewster saying of it in 1876 (Bull. N. O. C., p. 18): ". . . the establishment of a fixed fact like that recently developed, of the regular seasonal appearance in considerable numbers of *Passerculus princeps* along our New England coast, cannot fail to prove of the utmost practical value to the ornithologist, and reflectant of great and lasting credit on the fortunate discoverer." In 1878 Dr. J. A. Allen gave the Ipswich Sparrow in his list of birds of Massachusetts as a "rare winter visitant, occurring chiefly near the coast. Has been met with from Prince Edward's Island and New Hampshire to Long Island." "Prince Edward's Island" must be a slip of the pen, for the species has never been taken there. In that year Dr. T. M. Brewer remarked that "the gradual accumulation of observations in reference to this new and rare species

point to its regular migratory appearance along the Atlantic coast of New England in considerable numbers." Dr. Coues in the same year contributed an important paper, containing the bibliography and synonymy of the species to date, as well as that of Baird's Sparrow, with a colored plate of the latter. The year 1878 also marked the appearance of the part of Mr. Maynard's quarto work containing a wretched colored plate of '*Passerculus princeps*' and a complete account of the species, in many respects the best that has ever been published.

In the following year appeared Mr. Jeffries's sketch of the bird as observed at Swampscott, Mass., chiefly during the autumn of 1878. It is an important contribution, although perhaps a little too dogmatic in some of its statements which are not entirely borne out by the facts. An argument against the specific distinctness of *princeps* from *savanna* is presented. Unfortunately, however, the measurements given do not show proper cognizance of sex in making comparisons, nor is it conclusively proved that intermediate specimens were found. As a matter of fact the female *princeps* is of the size of the male *savanna*, while the male *princeps* is considerably larger. In 1881 Mr. Stearns's work on New England birds, edited by Dr. Coues, was published, in which may be found a good review of the bird's history.

By 1882, the Ipswich Sparrow began to be considered a common species in New England, and Mr. N. C. Brown thus wrote of it: "The once prized Ipswich Sparrow (*Passerculus princeps*) must now take its place among the common autumnal migrants of southern Maine, though restricted, so far as I am aware, to the seacoast. In the spring, however, it is uncommon if not rare. Since the capture of the first Maine specimen* March 20, 1875, I have seen but two other spring specimens. These I found upon Old Orchard Beach, March 28, 1882, and one of them is now in my collection. In their autumnal migration the birds reach Cumberland County about Oct. 13, remaining at least until Nov. 6, later than which I have never looked for them. Upon almost any day between these dates the collector may find a dozen or more individuals along the sandy shore between Scarborough Beach and the Saco River." (Bull. N. O. C. VII, 190.) In 1883 Mr. M. Chamberlain recorded a flock of about twenty (a number far exceeding anything ever recorded elsewhere) seen on April 11, near St. John, N. B. In the same year Mr. H. K. Job wrote that "Ipswich Sparrows can at last be ranked almost as common birds upon our seacoast in the late fall. Last year I saw them first on October 28, in Boston Harbor, and for about a month found more speci-

* * See Rod and Gun, Vol. VI, p. 65 [= p. 81]."

mens than I could possibly desire to shoot. The main body leaves us late in November, but stragglers are occasionally found during the winter."

The following paragraph, published in the July, 1884, number of 'The Auk' by Mr. R. Ridgway, has been productive of good results: "The National Museum possesses a considerable series of eggs labelled '*Passerculus savana*, Sable Island, Nova Scotia, July, 1862; J. P. Dodd,' which are uniformly so much larger than those of the Savannah Sparrow as to strongly suggest the probability that they may be in reality those of the Ipswich Sparrow. At any rate the matter is worth investigating, and it is hoped that some reader of 'The Auk' may be able to decide the question." Dr. C. H. Merriam promptly followed up this clue, and in the October number of the same journal we read: "Acting upon the above suggestion I immediately wrote to the Rev. W. A. Des-Brisay, a resident missionary of Sable Island, requesting him to send me a specimen of the common 'Gray Bird' of the Island. This he was kind enough to do, and the specimen, in confirmation of Mr. Ridgway's suspicion, proves to be an unquestionable Ipswich Sparrow." Here the matter rested for the next ten years, and it is obvious the connection between the eggs and the 'Gray Bird' was not established without leaving a margin of doubt.

Meanwhile '*Passerculus princeps*' became '*Anmodramus princeps*' in 1885, was "relegated to the commonplace" on Long Island, N. Y., by Mr. Dutcher in 1886, and its southern range was extended to Virginia by Dr. Rives in 1890, and finally to Georgia by Mr. Worthington in the same year. Possible breeding grounds have been visited on the sandy portions of the Magdalen Islands by Mr. Maynard, Mr. Cory and Dr. Bishop; I have sought them on Prince Edward Island and the adjacent coasts of New Brunswick and Nova Scotia, including Cape Breton Island, which has also been visited by Messrs. F. H. Allen, F. Bolles, W. Faxon, and R. Hoffman, but none have been found. Hence it becomes extremely probable that the Ipswich Sparrow is an island species, confined to Sable Island, where it has made its home perhaps for centuries.

DISTRIBUTION AND MIGRATION.

The fact, already stated, that the Ipswich Sparrow has not been found breeding at any favorable locality along the seacoast of Nova Scotia, Newfoundland, or Labrador, nor anywhere on the shores of the Gulf of St. Lawrence, points pretty conclusively to the probability of Sable Island being its sole breeding ground. It may therefore be considered a good example of an island species, probably related at one time to the Savanna

Sparrow of the mainland by ties that cannot now be traced. During the migrations it is often associated with the Savanna Sparrows, but unlike them it is strictly littoral by habit. But two instances have come to my knowledge (disregarding the more than doubtful records from Texas and New Hampshire), where the bird has been captured out of hearing of the surf,—one ten miles inland near New Haven, Conn., by Dr. Bishop (*Auk*, VI, 1889, p. 199), and one at Cambridge, Mass., by Mr. Charles R. Lamb.

Their pallid colors are undoubtedly due to environment, as their whole life is spent among hillocks of bleached and drifted sand. Even from the most verdure-clad valleys of Sable Island, where they preferably abide during the breeding season, it is but a step into a desert, and although occasionally found at other seasons along the rocky coasts of the mainland, it seems probable that the birds only visit such localities as they pass along in migration. A few brave the winters of their island home, and are often seen about the stations when the ground is covered with snow, feeding among the barnyard fowls. They have frequently been observed to fall dead while flying, and the children have attributed their death to the expansive force of the corn-meal they have eaten!

Mr. Boutilier tells me the 'Gray Birds' begin to diminish in numbers early in September, and it is probable the great majority leave Sable Island late in the autumn, scattering southward along the New England shores. Here some linger through the winter, but the bulk presses farther south; and birds have been found, when careful search has been made, even as far south as Georgia, where two have been taken in January at the mouth of the Altamaha River. There are no autumn or winter records for any point north of Portland, Maine, and, it may be added, there are very few spring records for New Brunswick or Nova Scotia. The birds seem to winter chiefly south of New York City, and are reported as common at Cobb's Island, Virginia, but observations at all localities are usually confined to flying trips made to the seashore by the enthusiastic collector, and consequently the distribution and migratory movements of this species are even now imperfectly understood. They appear to reach Massachusetts (where probably the most careful observations have been made) with one of the early 'cold waves,' pretty regularly from the middle to the last of October, and Long Island, New York, at very nearly the same time or perhaps a few days later. For a month or more they may be abundant, and after that, as a general rule, only stragglers can be found.

On their return northward in the spring they reach Long Island during March, usually the last two weeks or a little earlier if the weather be mild, and loiterers may be found in the early April days. In Massachusetts

they pass northward late in March and during the first week in April. They are said to reappear gradually on Sable Island in the month of May. Near New York City I have occasionally seen, in March, small restless parties of five or six, evidently migrants, as well as numerous single birds, in places where none were to be found at previous visits made in February. During some winters, however, a good many may be found on Long Island, as is borne out by my own observations and those of others who have searched for them; but in these winters a considerable influx of birds is usually perceptible just about the middle of March. I have taken specimens in every month from October to April, and others have done the same in Massachusetts; although as a rule mid-winter specimens even in the latitude of New York City are not always discoverable. November and March are the months when the greatest number of birds may be confidently expected, and a dozen or more may sometimes be secured in a single day. Still they are seldom really abundant, and are usually so scattered over large areas of bleak sand-hills, that each specimen in one's collection means many a mile trudged through yielding sand that slips from beneath the feet at every step.

Spring specimens usually show evidences of the spring moult, which is seldom completed (especially about the head and eye-ring) while the birds are in New England. The fall moult is accomplished before they return, and is in progress during August, judging from some skins sent me from Sable Island. While there, I learned that they had perceptibly decreased in numbers in recent years, and were possibly not more than one tenth as abundant as they were five years ago. It is probable that their natural enemies already alluded to are responsible for this decrease. What will be their fate when their island home shall have been entirely submerged, is a question for future observers to settle, — it is not likely to be one of our day and generation.

HABITS.

While the birds linger in their winter haunts they are apt to be shy, hiding away singly among the thicker tufts and patches of the brown beach-grass that is so characteristic a feature of the sand-dunes. We all of us know the stiff, sharp points of this grass in the midst of each tuft, on which we carelessly place the hand, and we have all of us seen the magic circles traced in the sand by the tips of the drooping blades as they sway in the breeze. Here we look for the Sparrows, and perhaps may spy one scampering away rapidly, head down, in and out among the tussocks. Now and then he stops to take an observation, standing up very straight as if on tiptoe to get a better view of you through the slender screen of grass-blades. He seldom

allows a near approach, and presently takes wing, sometimes with a single chirp, oftener flying silently and rapidly long distances before dropping to the ground. The more actively they are pursued, the wilder they become and the further they will fly each time they are flushed, and the faster they seem to run from the spot where the breathless collector expects to find them. They often permit you to come within a few yards of them when first disturbed, and they never spring from under your very feet, probably because they start to run away the moment you are observed; but after once flushing them it is by no means certain you can put them up a second time. I have sometimes seen them alight on bushes or trees or fences, but on these rare occasions they have generally been with flocks of Savanna and other Sparrows not far from treeless wastes of gently rolling sand-hills. Sometimes they are found on salt marshes, but they seem much to prefer dry, open sand-hillocks well covered with grass, or the depressions among them.

On Sable Island, as might be expected, they were comparatively tame, although even there not permitting a very close inspection. They watch you, especially when singing from the tops of the sand-hills or the bushes, with evident suspicion, and as there is no cover they are not easily stalked. When you approach, they become restless, repeatedly crouching down as if about to fly, bobbing up again, and, finally, either slipping quietly down the opposite side of the sand-hill, or more frequently standing their ground until you are within a few yards. Meanwhile their uncertainty of mind is voiced by occasional sharp chirps, and presently they suddenly depart with brisk, undulating flight, following the inequalities of the ground until hidden by a distant hill. If pursued from place to place, they soon become very wary and will fly until they are nearly out of sight before alighting.

When undisturbed in search of food, they walk jauntily about on the ground or over the shiny green carpet of Crowberry, the head nodding like a pigeon's, the tail raised at a slight angle with the back. They indulge in sundry little hops and flirtings of the wings and tail when they hasten their steps to overtake some luckless insect, but their every movement is deliberate as compared with the racing gait with which we associate them when on our own seashore. They most frequented the vicinity of the ponds, and abounded towards the eastern end of the island where the hills and valleys are most extensively clothed with the Crowberry and the Juniper, in the many snug nooks and pockets of which they hide away their cosy nests or find refuge at night from the penetrating, fog-laden air. When seen against this dark green background the birds looked very pale, while contrasted with the sand over which they ran or flew they

appeared obviously darker. The fact that I seldom found them on the half-naked sand-hills might argue against their pallid colors, but we must remember that most of them spend only a small part of their lives amid the oases of Sable Island.

It was impossible to pry much into their domestic affairs, they were so retiring. All seemed to be mated at the time of my arrival, and they appeared to take life very quietly. The demeanor of the males, when paying court to their admiring mates, was largely a parade of bowings and flutterings, accompanied by a low murmuring chirruping. Only once did I actually catch the males quarrelling among themselves; but towards the end of my stay I secured several with heads so denuded of feathers that it was evidently not a question of whether they had been fighting, but of how much. Very little solicitude was displayed in regard to their nests. The males seem to give notice of a stranger's approach. Your attention is perhaps attracted by mild and deliberate *tehips* that proceed from a bird sitting most stolidly on a clump of pigmy rose-bushes, and presently he is mysteriously joined by his mate. Both will continue to expostulate at irregular intervals, seldom shifting their positions, though nervously turning this way and that as long as you remain in the vicinity, and they are very polite about it all and never attempt to heap upon you such torrents of abuse as you often receive at the hands of other species. It is most difficult to detect the females leaving the nest, unless incubation is considerably advanced, but at this period they sit very closely and, only when nearly trodden upon, will they flutter away, feigning injury.

SONG.

I well remember the first morning on the island. The sun was feebly struggling with the drifting fog that dimly revealed the treeless, ragged sand-hillocks stretching away into the distance; the air was chill, and all about me were strange sights and sounds. Amid the chorus of unfamiliar notes I soon detected those for which I had travelled far, and spied an Ipswich Sparrow singing away on an adjacent sand-peak, quite unconscious of the sensation he was creating. Probably none of the songsters afterwards heard impressed me as did this one, for the song was one of the many novelties I enjoyed on Sable Island. I was prepared to hear a song on the same pattern as that of the Savanna Sparrow — nor was I disappointed. It was gratifying to know that the bird really could sing, for it is one of the most silent of our winter visitors, its sole note being a sharp, dry *tsip* uttered on rare occasions. Both sexes make use of this note on Sable

Island, only far more frequently. It is an everyday salutation there, as much as to say, "Here I am, what do you want, *eh?*" It is pitched a little lower and modified to a *tchip*, when the birds are anxious about their nests, and when the males are quarrelling, or paying court to the females, it degenerates into a rolling chatter. None of these notes are loud, and the full song is not much to be proud of, musically considered; and yet, compared with that of the Savanna Sparrow, it is a more polished and tuneful effort. Those who know the song of this bird may gain some idea of that of the Ipswich Sparrow when I say that the song of *princeps* is keyed a little lower and finished up with more of a trill. Analyzed, it consists of three parts, and usually occupies a short two seconds in its delivery. It begins with two or three rapid, introductory notes, thin, high-pitched, and slightly sibilant, occupying perhaps one quarter of the entire time; these are followed quickly by a prolonged, still more sibilant, grasshopper-like lisp, that consumes five eighths more of the time, and the song concludes, without pause, in a trill (keyed very like the note of the little tree-toad, *Hyla pickeringii*), on the first part of which considerable emphasis is placed, the end fading out with interrogative inflection. Even in calm weather, the song is quite inaudible at a couple of hundred yards, but the trill, brief as it is, is heard further than any other part, and may be the only sound distinguishable. As you draw nearer, the sibilant portion is heard, while the introductory notes may not be audible until you arrive within a very few yards. A graphical representation of the song would be something as follows, the spaces between the vertical lines representing roughly quarters of a second: *tsip- | tsip- | t's | ē- | ē- | ē- | pr-rē-ē-āh*. The finishing trill is usually swung out with a vim, unlike the weaker, higher-pitched tinkle of *A. s. savanna*, and contrasts pleasantly with the thin, high notes and lisp that precede it. It is in this part of the song that individual singers vary most, differing in quality, force and length of tone not only from their neighbors' efforts, but sometimes from their own. On the whole, there are few variations. Sometimes the number of introductory notes is increased or diminished, and sometimes the trill is little more than a musical ripple and like an overflow of the sibilant note. This sad little chant is repeated several times in the minute, but rarely for more than a few minutes at a time, when the singer either seeks a new perch or devotes himself for an indefinite period to the quest for food. They sing at irregular intervals, the favorite hour being at dusk, when you may often hear round about you as many as five or six, each pouring forth his mournful trill which seems in perfect keeping with the sombre surroundings. They are also more musically inclined in the early morning hours. They sang regardless of the fog, to which they are so well accustomed, nor did they, as is the wont

of many birds, greet the sun as it now and again pushed aside the fog curtains with its long yellow rays. Bright days did not inspirit them, nor did dull ones depress them.

The first place to look for a musician is along the sky line of a neighboring sand-hill, where he often may be descried, perched a few inches from the ground on a tuft of grass, sometimes on the bare sand. He may choose, however, a tiny thicket, a turfy hillock, the telephone wires or poles, or a fence, from which vantage point a single trill may be all that is vouchsafed, or the song may be repeated a few times. Wrapped in my coat, I have plodded along, so shut in by the cold sheets of streaming fog that I could only liken my surroundings to the sand-hills of our own coast during a winter's snowstorm, and have listened in vain for some sign of the presence of the Sparrows that I felt sure were in my vicinity. Presently one is discovered walking about on the ground in search of food, and a few minutes later he mounts a brown hummock, throws back his head, and breaks into song. Others, far and near, promptly join in chorus, and for several minutes the air fairly rings with answering songs. Then ensues a period of such perfect silence, ten, fifteen, twenty minutes, that it is hard to believe there is a single bird within earshot. If, however, you will have patience, the chorus will very possibly begin again.

NEST AND EGGS.

No nest of the Ipswich Sparrow had hitherto been secured, and the identification of the supposed eggs from Sable Island in the National Museum (see Auk, I, 1884, 292 and 390) had rested on presumptive probability rather than on satisfactory evidence. With these facts in mind, I devoted much time to the search for nests on Sable Island, and had the pleasure of examining nine or ten, from which five complete sets of eggs were obtained. The other nests were either abandoned, or only partly constructed when I left. On my arrival I was told that the 'Gray Birds' usually began to lay in June. It soon became evident that some were already incubating, and in view of the past season being considered a backward one it is probable that in average seasons many of the sets are completed by the last week in May. On June 2, after several days' diligent search, I found the first nest; and had I not been spying into all sorts of likely and unlikely places I should never have looked in upon the three fresh eggs it contained. As I afterwards learned, it was in an unusual situation, being placed in a small tuft of beach-grass (*Ammophila arenaria* (L.)), one of several bordering an expanse of soft, muddy bog at

the foot of a turf-covered hillock, brown and bare. For several days I visited the nest repeatedly, approaching under cover of the hillock with the utmost care, only to find that the bird somehow slipped away unobserved, leaving the eggs warm behind her. By June 4 two more eggs had been added, and on June 8 I finally secured the bird and set, as well as an indifferent Kodak photograph of the nest *in situ*.

I found another nest on June 2. It was just completed, and was placed on a slope where a cattle path had left a projecting edge of sod. There was almost nothing to conceal the nest, and it is possible its conspicuousness caused its abandonment before any eggs were laid. Another, found by Mr. Mackay eight miles down the island, at 'No 3,' was reported the same day, and contained four eggs. These I took on June 4, obtaining a Kodak picture of them as they lay in the nest, which occupied an unusual site. It was in a little hollow made by the wind, beneath a short bit of board that lay on a flat stretch of bare sod scantily covering the sand beneath. The bird was flushed, although she tried to skulk away where there was not concealment even for a mouse. Later in the day I reached the eastern lighthouse, near which I was shown two other nests, with four eggs each, by the members of Mr. Tobin's family. One was embedded in a bank of Crowberry near a small pond, the other in a clump of rosebushes. The last set I obtained was on June 11, when I almost trod upon the bird as, slipping from the nest, she fluttered away along the ground. It was in a tiny clump of budding bushes and grass, and contained five eggs, probably two thirds incubated. Shortly before my departure I found the beginnings of several other nests, marked by the characteristic little cups made in the sand by the birds, in some of which a few grass-blades had been deposited. One was in the midst of a prairie of Juniper, a few straws straggling from beneath an upraised spray attracting my attention to the nest in the depths below. All the nests seem to be carefully concealed, and there is so much ground over which they may be scattered that it is no easy matter to secure them. I am told that the more favored nesting sites are steep, grassy slopes, terraced often by zigzagging cattle paths, where ample protection is afforded behind the lattice-work of bleached and storm-matted grasses. Everywhere the trailing stems of the Crowberry and Juniper lend a canopy for nests that sometimes repose in beds of mosses and lichens, or the edge of some dense little clump of bushes is chosen.

No matter where situated, each nest is placed in a cup-shaped hollow about four inches in diameter and fully two in depth, scratched in the sand by the birds. It is compactly woven, and well calculated to keep out the icy atmosphere that so often prevails on Sable Island even on midsummer

days. It is a much more pretentious affair than that of the Savanna Sparrow, and has the effect of a nest built of hay and stubble, lined with paler, finer straw. There are two distinct parts, an outer shell of coarse materials that are disposed like a rim, and an inner cup of closely woven, slender grasses. The little basin first excavated by the birds is filled in at the sides and around the margin with dead weed stalks, various coarse grasses and sedges, bits of moss, or similar materials. These form a shell rising about an inch above the surface of the sand and straggling out over it for an inch or two. The shell is lined almost wholly with the finer bleached blades of an unidentifiable species of *Carex*, a few wiry horse-hairs, or tufts from the shaggy ponies or cattle, being sometimes added. The lining is circularly disposed, and smoothed down as only a bird can do it, leaving between the eggs and the sand beneath an inch, more or less, of closely woven grass, while higher up the walls are considerably thicker on account of the added outer shell.

Until it was proved that no Savanna Sparrow bred on Sable Island, the 'Gray Birds' eggs collected in 1862 (before the species was discovered), and now in the National Museum, were open to doubt. I have in my possession a set of *savanna* that is absolutely indistinguishable in every particular from one of the sets of *princeps* now before me. To misuse a term, I might say that the eggs intergrade; and we should naturally expect northern-breeding *savanna* to lay even larger eggs than those of this set. However, I now have before me five authentic sets of *Ammodramus princeps*, two with five eggs, and three with four, making twenty-two eggs in all, from which I derive the following measurements:—

Average size, 21.6 mm. (.85 in.) × 15.5 mm. (.61 in.).

Extremes of length, 23.1 mm. (.91 in.) to 20.3 mm. (.80 in.).

Extremes of diameter, 15.7 mm. (.62 in.) to 15.2 mm. (.60 in.).

They average a little larger than the eggs of *A. s. savanna*, from which they are otherwise indistinguishable, and they resemble the eggs of several other Sparrows. The ground color is bluish or grayish white, often so washed with brown as to appear olive brown, and usually so splashed and sprinkled with different shades of umber and vandyke brown as almost to conceal the color of the shell. There are also purplish and grayish brown markings that are less apparent on most of the eggs than are the bolder blotches of the deeper browns that in the majority of cases aggregate about the larger end and form there a ring. A good many of the eggs have besides a few irregular hair lines (as if done with a pen) of deep brown. The eggs of the same set will vary much in coloration, and several very brown and slightly spotted eggs may be associated with a bluish blotched egg that looks as if it belonged to some other set. The shape is usually ovate, but in one set the eggs are long and slender.

The nests are often found by the people on Sable Island, and they tell me four is the usual number of eggs in a set, although sometimes five are laid. The data and measurements of the nests and eggs I secured are as follows:—

NEST A. — Sable Island, N. S., June 4, 1894.

Eggs — four, nearly fresh, 21.6×15.2 , 21.8×15.7 , 21.0×15.2 , 21.8×15.5 mm.

Nest — outside depth 89; outside diameter 127; inside depth 46; inside diameter 57 mm.

Materials — coarse weather-stained grasses and a little eel-grass; lined with the bleached and delicate blades of a sedge (*Carex*).

Site — beneath a bit of board on a flat stretch of turf, on shore of salt-water lagoon. The turf was sandy, and the grass very short.

NEST B. — Sable Island, N. S., June 4, 1894.

Eggs — four, slightly incubated, 21.3×15.2 , 21.0×15.2 , 20.6×15.2 , 21.8×15.8 .

Nest — outside depth 57; outside diameter 121; inside depth 41; inside diameter 57.

Materials — coarse grass, weed stems, and a little green moss; lined with the pale slender blades of a sedge.

Site — in the midst of a clump of Crowberry on a slope near a fresh-water pond.

NEST C. — Sable Island, N. S., June 4, 1894.

Eggs — four, slightly incubated, 21.6×15.8 , 21.8×15.5 , 22.3×15.8 , 20.6×15.5 .

Nest — outside depth 76; outside diameter 121; inside depth 45; inside diameter 57.

Materials — coarse beach-grass, other dark, weather-stained grasses, stalks of everlasting and other weeds, and bits of green moss; lined with fine, bleached sedge, a few horse-hairs, and bunches of a softer hair, probably from cattle.

Site — in a thicket of rose bushes on dry, hummocky ground.

NEST D. — Sable Island, N. S., June 8, 1894.

Eggs — five, slightly incubated, 23.1×15.2 , 22.9×15.2 , 22.6×15.2 , 23.1×15.5 , 22.9×15.2 .

Nest — outside depth 76; outside diameter 114; inside depth 51; inside diameter 51.

Materials — dead grass and weed stems and a little green moss; lined with fine sedge and a few horse-hairs.

Site — in tuft of dead beach-grass on the boggy margin of a small pond. The grass arched over it.

NEST E.— Sable Island, N. S., June 11, 1894.

Eggs — five, much incubated, 20.6 × 15.8, 20.6 × 15.2, 20.3 × 15.5, 20.6 × 15.8, 20.8 × 15.8.

Nest — outside depth 64; outside diameter 102; inside depth 45; inside diameter 64.

Materials — dead weed stalks; lined with fine blades of sedge and a few horse-hairs.

Site — in hummock of blueberry bushes and rose bushes mixed with dead grass and growing sorrel.

NEST F.— Sable Island, N. S., June 11, 1894.

Nest (deserted) — outside depth 70; outside diameter 102; inside depth 45; inside diameter 64.

Materials — coarse, dead grasses and weed stems; lined with fine blades of a sedge and some bits of soft hair.

Site — under edge of sod, on a sloping bank.

FOOD.

I am indebted to the Department of Agriculture for the results of the examination of the contents of fifty-six stomachs, all, save thirteen, of my own collecting. A summary of this material is as follows:—

	<i>Animal matter, %</i>	<i>Vegetable matter, %</i>	<i>Gravel, etc. (chiefly sand), %</i>
19 summer specimens from Sable Island, N. S.,	75.5	15.2	9.3
37 winter specimens from Long Island, N. Y., and New Jersey,	7.3	57.8	34.9

The large percentage of animal matter (insects chiefly) in the summer food of the Ipswich Sparrow is in striking contrast to the winter deficiency. Twenty-four of the winter specimens contained no animal matter at all, or

only a trace, and the increase of gravel and sand in the winter food is no doubt necessary in grinding up the largely increased percentage of seeds.

Mr. F. E. L. Beal of the Department has identified, among the various fragments found in the stomachs of the summer specimens from Sable Island, the following: Beetles and their larvæ, represented by scarabæids (*Aphodius fimentarius* identified), carabids, elaterids, cicindelids, and weevils; caterpillars, as well as pupæ and pupa-cases; grasshoppers; ants (including one pupa), and other hymenoptera; hemiptera; diptera; spiders (also eggs and cocoons); snails; seeds, herbage, and rubbish, unrecognizable, except seeds or granules of *Myrica cerifera*, *Cornus canadensis*, *Rumex acetosella*, and *Vaccinium* sp. ?; bits of shell and shells of bivalve molluscs probably swallowed with the sand and gravel.

The winter diet appears to consist largely of the seeds and hulls of an unrecognizable grass, together with several other unknown seeds, as well as *Chenopodium* sp.?, *Eragrostis* sp.?, *Polygonum articulatum* and rye. The animal food in winter consists of beetles, among them scarabæids (represented by *Aphodius inquinatus* and *Aphodius fimentarius* (probably)), and weevils; caterpillars and their cocoons; hymenoptera (including some ants); diptera; spiders' cocoons; snails. The rest of the stomach contents in winter is made up of the usual sand and gravel which sometimes is mingled with cinders or slag and bits of coal.

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- Hardly citable, but of interest as probably containing the first published reference to the Ipswich Sparrow, although the species was not recognized as a new one until many years later. The reference reads as follows: "A little brown Sparrow, (*Fringilla*), also summered and wintered there."
1869. MAYNARD, CHARLES JOHNSON. The Capture of the *Centronyx bairdii* at Ipswich. — *Amer. Nat.* III, p. 554.
- The single specimen taken December 4, 1868, and here recorded, was later recognized as belonging to a new species, and became the type of *Ammodramus princeps*. Cf. Coues, 3d instal. bibliog., *Bull. U. S. Surv. Terr.* V, 1879, no. 4, p. 637, 1880.
- 1869-70. ALLEN, JOEL ASAPH. Notes on some of the Rarer Birds of Massachusetts. — *Amer. Nat.* III, pp. 513, 631, 632.
- Also, 1869, pamphlet, repaged, pp. 9, 32-34. A more extended notice than Mr. Maynard's upon the capture of the supposed *Centronyx bairdii*.
1870. MAYNARD, CHARLES JOHNSON. The Naturalist's Guide in collecting and preserving objects of natural history, with a complete catalogue of the Birds of Eastern Massachusetts. By C. J. Maynard. With illustrations by E. L. Weeks. Boston: Fields, Osgood, & Co. 1870. 12mo. Part II. Catalogue of the Birds of Eastern Massachusetts with notes relative to their migration, habits, etc., etc. pp. 112-117.
- An original description with a frontispiece of the type specimen of *Ammodramus princeps*, the discoverer, however, supposing he was redescribing *Centronyx bairdii*. There is also a pen-picture of the Ipswich sand-hills and an account of the capture of the Sparrow.
- 1877, revised edition, pp. 112-117. The original article is rewritten in part, explanations are made, a hand-colored plate, facing p. 89, is substituted for the woodcut, and the species is correctly named.
1870. SAMUELS, EDWARD AUGUSTUS. The Birds of New England and Adjacent States: containing Descriptions of the Birds of New England, and adjoining States and Provinces, arranged by a long-approved Classification and Nomenclature; together with a History of their Habits, Times of Arrival and Departure, their Distribution, Food, Song, Time of Breeding, and a careful and accurate Description of their Nests and Eggs; with Illustrations of many Species of the Birds, and accurate Figures of their Eggs. By Edward A. Samuels, Curator of Zoology in the Massa-

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The first edition of this hydra-headed work that contains an appendix, in which under '*Centronyx bairdii*' appears mention of the capture of Mr. Maynard's supposed specimen. A retitled edition, as late as 1883, does not revise the record!

1872. BREWSTER, WILLIAM. Birds New to Massachusetts Fauna. — Amer. Nat. VI, p. 307.

Records capture by Mr. Maynard, at Ipswich, of a second and a third specimen of the supposed *Centronyx Bairdii*.

1872. COUES, ELLIOTT. Key to North American Birds containing a concise account of every species of Living and Fossil Bird at present known from the continent north of the Mexican and United States boundary. Illustrated by 6 steel plates, and upwards of 250 woodcuts. By Elliott Coues, Assistant Surgeon United States Army. Salem: Naturalists' Agency. New York: Dodd and Mead. Boston: Estes and Lauriat. 1872. Imp. 8vo. pp. 135 and 352.

In the appendix due credit is given Mr. Maynard for the newly recognized *Passerculus princeps*.

1884, 2d edition, an extended description at pp. 361, 362; the 3d ed., 1887, and 4th ed., 1890, are printed from the same plates, and appendices are added.

1872. MAYNARD, CHARLES JOHNSON. A New Species of *Passerculus* from Eastern Massachusetts. — Amer. Nat. VI, pp. 637, 638.

The three known specimens are at last recognized as belonging to a new species which is named *Passerculus princeps*. Cf. Zoological Record for 1872, p. 51, 1874, and Coues, 3d instal. bibliog., Bull. U. S. Surv. Terr. 1879, V, no. 4, p. 638, 1880.

1873. COUES, ELLIOTT. Notes on Two little-known Birds of the United States. — Amer. Nat. VII, p. 696.

The birds are *Centronyx bairdii* and *Anthus spraguei*, with references to the supposed Massachusetts specimens of the former species.

1873. COUES, ELLIOTT. A Check-List of North American Birds. By Elliott Coues Salem: Naturalists' Agency. 1873. 8vo. pamph., p. 31.

Also issued as the second part of 'Field Ornithology,' etc., 1874, *q. v.* We find here the name 'Maynard's Sparrow.'

1882, 2d edition, is far more pretentious, and 'Ipswich Savanna Sparrow' is the name bestowed at p. 52.

1874. BAIRD, SPENCER FULLERTON, BREWER, THOMAS MAYO, and RIDGWAY, ROBERT. A History of North American Birds by S. F. Baird, T. M. Brewer and R. Ridgway Land Birds Illustrated by 64 colored plates and 593 woodcuts Volume I. [Vignette] Boston Little, Brown and Company 1874. Sm. 4to. Vol. I, pp. 533 and 540-542, pl. 25, f. 2.

This history is founded on the three known specimens. Twice in the text the name '*P. maynardi*' is made use of, no doubt inadvertently.

1874. COUES, ELLIOTT. Field Ornithology. Comprising a Manual of Instruction for procuring, preparing and preserving Birds, and a Check-List of North American Birds. By Dr. Elliott Coues, U. S. A. [Monogram] Salem: Naturalists' Agency. Boston: Estes & Lauriat. New York: Dodd & Mead. 1874. 8vo.

At p. 31 of the Check-List, which was originally issued as a separate pamphlet in 1873, *q. v.*

1875. BREWER, THOMAS MAYO. Catalogue of the Birds of New England with brief notes indicating the manner and character of their presence; with a list of species included in previous catalogues believed to have been wrongly classed as Birds of New England. — Proc. Bost. Soc. Nat. Hist., XVII, p. 441.
Also 1875, pamphlet, repaged, p. 8. The Ipswich Sparrow is designated as "migratory, rare."
1875. BROWN, NATHAN CLIFFORD. Ornithological Notes from Portland, Maine. — Rod and Gun, VI, May 8, p. 81.
First record for Maine.
1876. BREWSTER, WILLIAM. On the occurrence of certain Birds in the New England States. — Bull. Nuttall Ornith. Club, I, p. 18.
1876. BREWSTER, WILLIAM. The Ipswich Sparrow in New Brunswick. — Bull. Nuttall Ornith. Club, I, p. 52.
First record for New Brunswick (Pt. Lepreaux). Cf. Zoölogical Record for 1876, p. 49, 1878, and Coues, 3d instal. bibliog., Bull. U. S. Surv. Terr. 1879, V, no. 4, p. 641, 1880.
1876. JORDAN, DAVID STARR. Manual of the Vertebrates of the Northern United States, including the District east of the Mississippi River, and north of North Carolina and Tennessee, exclusive of marine species. By David Starr Jordan, M. S., M. D. Professor of Natural History in N. W. C. University, and in Indiana State Medical College. Chicago: Jansen, McClurg & Company. 1876, 12mo. p. 84.
1878. 2d edition, p. 84. Changes made do not affect the birds.
1880. 3d edition, p. 84.
1884. 4th edition, p. 84.
1888. 5th edition, p. 286.— Complete revision of this work.
1876. MERRIAM, CLINTON HART. *Passerculus princeps* and *Parus hudsonicus* in Connecticut. — Bull. Nuttall Ornith. Club, I, p. 52.
First record for Connecticut. Cf. Zoölogical Record for 1876, p. 49, 1878, and Coues, Birds of the Colorado Valley (Bibliographical Appendix), p. 726, 1878.
1877. BAILEY, HARRY BALCH. Occurrence of *Passerculus princeps* in New York. — Bull. Nuttall Ornith. Club, II, pp. 78, 79.
First record for New York. Cf. Coues, 3d instal. bibliog., Bull. U. S. Surv. Terr., 1879, V, no. 4, p. 642, 1880.
1877. BROWN, NATHAN CLIFFORD. Notes on Birds new to the Fauna of Maine, etc. — Bull. Nuttall Ornith. Club, II, pp. 27, 28.
A doubtful record for New Hampshire (Lake Umbagog), as the bird unfortunately could not be secured.
1877. GIEBEL, CHRISTOPH GOTTFRIED (ANDREAS). Thesaurus Ornithologiæ. Repertorium der gesammten ornithologischen Literatur und Nomenclator sämtlicher Gattungen und Arten der Vögel nebst Synonymen und geographischer Verbreitung. Von Dr. C. G. Giebel, Professor der Zoologie und Director des zoologischen Museums der Universität in Halle. Dritter Band. [Colophon] Leipzig: F. A. Brockhaus. 1877. 8vo. pp. 38 and 772.
It is stated that *Passerculus* is a synonym of *Zonotrichia*, and that "*Passerculus princeps* = *Zonotrichia princeps*."

1877. MAYNARD, CHARLES JOHNSON. The Naturalist's Guide, &c. 2d ed.
Cf. 1st ed. 1870.
1877. MERRIAM, CLINTON HART. A Review of the Birds of Connecticut, with
Remarks on their Habits. — Trans. Conn. Acad. Sci. and Arts, IV,
pt. ii, p. 36.
1877. MINOT, HENRY DAVIS. The Land-Birds and Game-Birds of New England
with Descriptions of the Birds, their Nests and Eggs, their Habits and
Notes. With Illustrations. By H. D. Minot. [Quotation] Salem, Mass.
Naturalists' Agency. Boston: Estes & Lauriat. 1877. 8vo. pp. 195-197.
Chiefly quotations from Maynard, no new facts are presented.
1878. ALLEN, JOEL ASAPH. A list of the Birds of Massachusetts, with Annota-
tions. — Bull. Essex Inst., X, p. 16.
1878. BREWER, THOMAS MAYO. Notes on Certain Species of New England Birds
with additions to his Catalogue of the Birds of New England. — Proc.
Bost. Soc. Nat. Hist. XIX, p. 305.
1878. COUES, ELLIOTT. Note on *Passerculus bairdii* and *P. princeps*. — Bull. Nuttall
Ornith. Club, III, pp. 1-3.
Contains synonymy and bibliography of both species, together with a colored plate
of *P. bairdii*. Cf. Ibis, II, p. 106, 1878; Zoologischer Anzeiger, I, p. 355, 1878; Coues,
3d instal. bibliog., Bull. U. S. Surv. Terr., 1879, V, no. 1, p. 643, 1880; Zoölogical
Record for 1878, p. 59, 1880; Coues, Check-List, p. 160, 1882.
1878. LAWRENCE, NEWBOLD TROTTER. Notes on Several Rare Birds taken on Long
Island, N. Y. — Forest and Stream, X, May 2, p. 235.
Five specimens taken at Far Rockaway, December, 1870, November, 1872, December,
1872, November, 1874, and January, 1878. Cf. Bailey's Index to F. & S. Bird Notes,
p. 110, 1881.
1878. LAWRENCE, NEWBOLD TROTTER. The Ipswich Sparrow (*Passerculus princeps*)
on Long Island, N. Y. — Bull. Nuttall Ornith. Club, III, p. 102.
Repetition of the original record (see previous title). Cf. Coues, 3d instal. bibliog.,
Bull. U. S. Surv. Terr. 1879, V, no. 4, p. 644, 1880.
1878. MAYNARD, CHARLES JOHNSON. The Birds of Florida with the Water and
Game Birds of Eastern North America, by C. J. Maynard. Illustrated.
C. A. Walker, Boston. C. J. Maynard & Co., Newtonville, Mass.
1878. 4to. part iv, pp. 101, 102.
One of the most complete accounts of the species ever published. Cf. Bull. Nuttall
Ornith. Club, III, p. 145, review by J. A. Allen, 1878; Coues, Birds of the Colorado
Valley (Bibliographical Appendix), p. 693, 1878; Maynard, The Birds of Eastern North
America, etc., 1881.
1878. [SMITHSONIAN report for 1877.]
Among list of donations for 1877 is one skin of "*Passerculus princeps*" from Massa-
chusetts, from Mr. C. J. Maynard.
1879. BREWER, THOMAS MAYO. Some additional notes upon Birds observed in New
England with the names of five species not included in his previous Lists
of New England Birds. — Proc. Bost. Soc. Nat. Hist. XX, pp. 270, 271.
Chiefly references to Mr. Jeffries's paper.

1879. BROWN, NATHAN CLIFFORD. Beach-Birds. — Lippincott's Mag. XXIII, May, 622.
Brief remarks on, and unrecognizable cut of, '*Passerculus princeps*.'
1879. JEFFRIES, WILLIAM AUGUSTUS. The Ipswich Sparrow (*Passerculus princeps*, Maynard). — Bull. Nuttall Ornith. Club, IV, 103-106.
A valuable contribution to the subject, containing observations upon a large number of specimens and discussion of the relation of the species to the Savanna Sparrow. Cf. Zoologischer Anzeiger, II, p. 317, 1879; Zoologischer Jahresbericht für 1879, p. 1158, 1880; Zoölogical Record for 1879, p. 54; Coues, 3d instal. bibliog., Bull. U. S. Surv. Terr. 1879, V, no. 4, p. 645, 1880.
1880. ABBOTT, WILLIAM L. *Passerculus princeps* in New Jersey. — Forest and Stream, XIV, Feb. 19, p. 44.
First record for New Jersey (Seven Mile Beach). Cf. Bull. Nuttall Ornith. Club, VI, p. 49, 1881.
1880. RIDGWAY, ROBERT. A Catalogue of the Birds of North America. — Proc. U. S. Nat. Museum, III, pp. 178, 217.
1880. WOOLSEY, GEORGE. The Ipswich Sparrow (*Passerculus princeps*) at New Haven, Conn. — Bull. Nuttall Ornith. Club, V, p. 121.
Cf. Zoologischer Jahresbericht für 1880, IV Abtheilung, p. 231, 1881.
1881. MAYNARD, CHARLES JOHNSON. The Birds of Eastern North America; with original descriptions of all the species which occur east of the Mississippi River, between the Arctic Circle and the Gulf of Mexico, with full notes upon their habits, etc., by C. J. Maynard; containing thirty-two plates drawn on stone by the author. Revised Edition. Newtonville Mass.: C. J. Maynard & Co. 1881. 4to. pp. 101, 102; pl. III.
A reissue, in board covers, of the first edition of this work, *vide* 1878.
1881. RIDGWAY, ROBERT. List of special desiderata among North American Birds. — Proc. U. S. Nat. Museum, IV, p. 211.
1881. SCOTT, WILLIAM EARLE DODGE. The Ipswich Sparrow (*Passerculus princeps*) at Squam Beach, New Jersey. — Bull. Nuttall Ornith. Club, VI, p. 116.
This place is perhaps better known as Squan Beach.
1881. STEARNS, WINFRED ALDEN. New England Bird Life being a Manual of New England Ornithology revised and edited from the manuscript of Winfred A. Stearns Member of the Nuttall Ornithological Club etc. by Dr. Elliott Coues U. S. A. Member of the Academy etc. Part I. — Oscines Boston Lee and Shepard Publishers New York Charles T. Dillingham 1881. 8vo. pp. 235-238.
The history of the Ipswich Sparrow, carried along into 1879, is here summarized.
1882. BROWN, NATHAN CLIFFORD. Remarks on Five Maine Birds. Bull. Nuttall Ornith. Club, VII, p. 190.
1882. BROWN, NATHAN CLIFFORD. A Catalogue of the Birds known to occur in the vicinity of Portland, Me., especially in the townships of Falmouth, Deering, Westbrook, Cape Elizabeth and Scarborough, briefly annotated, by Nathan Clifford Brown. Portland, Me.: William M. Marks, Printer. 1882. — Proc. Portland Soc. Nat. Hist., December 4, 1882, p. 13.

1882. CHAMBERLAIN, MONTAGUE. A Catalogue of the Birds of New Brunswick, with brief notes relating to their migrations, breeding, relative abundance, etc.—Bull. Nat. Hist. Soc. N. B., no. 1, p. 38.
Reference to the one bird taken at Pt. Lepreaux in 1876 by Mr. William Brewster.
1882. COUES, ELLIOTT. The Coues Check-List of North American Birds. Second Edition, Revised to Date, and entirely Rewritten, under Direction of the Author, with a dictionary of the Etymology, Orthography, and Orthoëpy of the Scientific Names, the concordance of previous lists, and a catalogue of his ornithological publications. [Monogram] Boston: Estes and Lauriat. 1882. Svo. pp. 52 and 160.
The bird is here called the "Ipswich Savanna Sparrow."
1882. INGERSOLL, ERNEST. Birds'-Nesting: A Handbook of Instruction in gathering and preserving the Nests and Eggs of Birds for purposes of study. By Ernest Ingersoll. Salem: George A. Bates. 1882. 12mo. p. 93.
The Ipswich Sparrow is mentioned among those "birds whose nidification is unknown."
1883. BREWSTER, WILLIAM. Notes on the Birds observed during a summer cruise in the Gulf of St. Lawrence.—Proc. Bost. Soc. Nat. Hist., XXII, 374.
Regrets expressed that no opportunity was afforded for exploring the sand-dunes of the Magdalen Islands in the expectation of finding the Ipswich Sparrow.
1883. CHAMBERLAIN, MONTAGUE. New Brunswick Notes.—Bull. Nuttall Ornith. Club, VIII, p. 8.
A flock of about twenty Ipswich Sparrows, associated with Song Sparrows, seen, April 11, on the sand flats near St. John, N. B. Cf. Zoologischer Jahresbericht für 1883, IV Abtheilung, p. 277, 1884.
1883. CHAMBERLAIN, MONTAGUE. Ornithological Notes.—Bull. Nat. Hist. Soc. N. B. no. 2, p. 40.
Duplicates the record just cited.
1883. DUTCHER, WILLIAM. Ipswich Sparrow.—Ornithologist and Oölogist, VIII, p. 48.
Eight specimens taken on Great South Beach, Long Island, N. Y. Cf. Auk, II, p. 99, 1885.
1883. GRIFFING, MOSES BOWDITCH. Ipswich Sparrows.—Ornithologist and Oölogist, VIII, p. 22.
Three specimens taken at Shelter Island, N. Y. Cf. Auk, II, p. 97, 1885.
1883. JOB, HERBERT KEIGHTLEY. Notes on some of the Winter Birds of Massachusetts.—Bull. Nuttall Ornith. Club, VIII, p. 148.
1883. SAMUELS, EDWARD AUGUSTUS. Our Northern and Eastern Birds. . . . Svo. p. 581.
Cf. edition of 1870, of which this is a retitled reprint with a supplement, but without corrections, and a dozen years behind the times.
1883. SMITH, EVERETT. The Birds of Maine. With Annotations of their Comparative Abundance, Dates of Migration, Breeding Habits, etc.—Forest and Stream, XIX, Jan. 11, p. 466.
The Ipswich Sparrow is said to be "not uncommon along the coast in autumn, but comparatively rarely seen in spring."

1883. W. A. Winter Birds.— Forest and Stream, XX, March 15, p. 124.
An Ipswich Sparrow shot near Boston, Feb. 22, 1883.
1884. COUES, ELLIOTT. Key to North American Birds. Containing a concise account of every species of living and fossil bird at present known from the Continent north of the Mexican and United States boundary, inclusive of Greenland. Second Edition, revised to date and entirely rewritten: with which are incorporated General Ornithology: an outline of the structure and classification of birds, and Field Ornithology: a Manual of collecting, preparing and preserving birds. By Elliott Coues, M. A., M. D., Ph. D., Member of the National Academy of Sciences, etc., etc. Profusely illustrated. [Monogram] Boston: Estes and Lauriat, 1884. Large 8vo. pp. 361, 362.
1884. DUTCHER, WILLIAM. Bird Notes from Long Island, N. Y.— Auk, I, p. 31.
For original record *vide* 1883, Dutcher.
1884. LANGILLE, J. HIBBERT. Our Birds in their Haunts: a popular treatise on the birds of Eastern North America. By Rev. J. Hibbert Langille, M. A. [Verse]. Boston: S. E. Cassino & Company, 1884. 12mo. p. 199.
Brief mention of the Ipswich Sparrow.
1884. MERRIAM, CLINTON HART. Breeding of *Passerculus princeps* on Sable Island.— Auk, I, p. 390.
First record for Nova Scotia; a specimen of the bird obtained during the summer. Cf. Zoologischer Anzeiger, VIII, p. 229, 1885; Zoölogical Record for 1884, p. 47, 1885; Zoologischer Jahresbericht für 1884, IV Abtheilung, p. 323, 1886.
1884. RIDGWAY, ROBERT. The Probable Breeding-place of *Passerculus princeps*.— Auk, I, pp. 292, 293.
Attention is directed to the large size of eggs from Sable Island, N. S., supposed to be of *A. s. savanna*. Cf. Zoölogical record for 1884, p. 47, 1885; Smithsonian report for 1884, pt. II, p. 357, 1885.
1885. BISHOP, LOUIS BENNETT. Ipswich Sparrow.— Ornithologist and Oölogist, X, p. 30.
Two specimens shot, presumably near New Haven.
1885. DUTCHER, WILLIAM. Bird Notes from Long Island, N. Y.— Auk, II, pp. 36, 37.
Many specimens in winter at Fire Island Inlet and Shinnecock Bay.
1885. DWIGHT, JONATHAN, JR. The Ipswich Sparrow (*Passerculus princeps*) in Delaware.— Auk, II, p. 105.
First record for Delaware. Cf. Zoologischer Jahresbericht für 1885, IV Abtheilung, pp. 187, 233, 1887.
1885. [JENCKS, FRED T.] The Ipswich Sparrow in Rhode Island.— Random Notes on Nat. Hist. II, p. 17.
First record for Rhode Island. Cf. Auk, III, p. 272, 1886.
1885. RIDGWAY, ROBERT. Some Emended Names of North American Birds.— Proc. U. S. Nat. Mus. VIII, p. 354.
The name *Ammodramus princeps* is adopted.

1885. [SMITHSONIAN report for 1883], pp. 221 and 331.
 Gift to the National Museum of twelve specimens in the flesh and one skin of the Ipswich Sparrow by Mr. William Dutcher.
1885. [SMITHSONIAN report for 1884], pt. II, p. 145.
 Gift of the twelve specimens mentioned in previous report, again recorded.
1886. ALLEN, JOEL ASAPH. A Revised List of the Birds of Massachusetts.— Bull. Amer. Mus. Nat. Hist. I, no. 7, p. 251.
 By some slip of the pen it is stated that the Ipswich Sparrow "has been met with along the coast from Prince Edward's Island to Delaware." It has never been taken on Prince Edward Island.
1886. AMERICAN ORNITHOLOGISTS' UNION. The Code of Nomenclature and Check-List of North American Birds Adopted by the American Ornithologists' Union being the report of the Committee of the Union on Classification and Nomenclature [Quotation] New York American Ornithologists' Union 1886. Svo. p. 265.
Ammodramus princeps is given, with its habitat "Atlantic coast, from Nova Scotia south, in winter, to Virginia."
1886. DUTCHER, WILLIAM. Bird Notes from Long Island.— Auk, III, pp. 441, 442.
 An account of *A. princeps*, which is "relegated to the commonplace" on Long Island.
1886. GOODALE, JOSEPH LINCOLN. Wintering of the White-throated and Ipswich Sparrows in Maine.— Auk, III, p. 277.
 Two taken, January 23, between Pine Point and Old Orchard.
1886. JONES, T. [= JOHN] MATTHEW. Occurrence of the Ipswich Sparrow (*Ammodramus princeps*) in Nova Scotia.— Auk, III, p. 135, 136.
 One shot at Laurencetown, near Halifax, about the end of March, 1878; first record for the mainland. Cf. Zoologischer Anzeiger, IX, p. 511, 1886.
1886. SENNETT, GEORGE BURRITT. Ipswich Sparrow in Texas.— Auk, III, pp. 135, 136.
 The improbability of this specimen having really come from Texas has been discussed in the foregoing pages (pp. 28, 29).
1887. CHAMBERLAIN, MONTAGUE. A Catalogue of Canadian Birds, with Notes on the Distribution of the Species. By Montague Chamberlain. Saint John, N. B. J. & A. McMillan, 98 Prince William Street, 1887. Svo. p. 85.
 "This species has been taken in New Brunswick and Prince Edward Island during the spring migration, and has been found breeding on Sable Island, off the Atlantic coast of Nova Scotia." As before stated, the species has never been taken on Prince Edward Island.
1887. RIDGWAY, ROBERT. A Manual of North American Birds. By Robert Ridgway. Illustrated by 464 outline drawings of the generic characters. Philadelphia: J. B. Lippincott Company, 1887. Large Svo. p. 407.
1888. CHAMBERLAIN, MONTAGUE. A Systematic Table of Canadian Birds. By Montague Chamberlain. Saint John, N. B. Published for the Author. 1888. Royal quarto. p. 10.

1888. COOKE, WELLS WOODBRIDGE. U. S. Department of Agriculture. Division of Economic Ornithology. Bulletin No. 2. Report on Bird Migration in the Mississippi Valley in the years 1884 and 1885, by W. W. Cooke. Edited and revised by Dr. C. Hart Merriam. Washington: Government Printing Office. 1888. Svo. p. 188.
Doubt expressed regarding the bird recorded from Texas (*Cf.* Sennett, 1886).
1888. JORDAN, DAVID STARR. A Manual of the Vertebrate Animals of the Northern United States including the district north and east of the Ozark Mountains, south of the Laurentian Hills, north of the southern boundary of Virginia, and east of the Missouri River inclusive of marine species by David Starr Jordan President of the University of Indiana. Fifth edition entirely rewritten and much enlarged. Chicago. A. C. McClurg and Company. 1888. 12mo. p. 286.
1888. SHARPE, RICHARD BOWDLER. Catalogue of the Passeriformes, or Perching Birds, in the Collection of the British Museum. Fringilliformes: Part III. Containing the Family Fringillida. By R. Bowdler Sharpe. London: Printed by order of the Trustees. 1888. Svo. pp. 679, 680.—Forming Vol. XII of 'Catalogue of the Birds in the British Museum.'
Contains synonymy and an elaborate description of this species.
1888. TORREY, BRADFORD. A November Chronicle.—Atlantic Monthly LXII, November, 1888, pp. 592-594; reprinted (with other sketches) in 'A Rambler's Lease' (1889), pp. 131, 132, 133, 136, 137.
1889. AMERICAN ORNITHOLOGISTS' UNION. Check-list of North American Birds According to the Canons of Nomenclature of the American Ornithologists' Union. Abridged edition. Revised. Published by the American Ornithologists' Union 1889. Svo. pamphlet, p. 48.
1889. BISHOP, LOUIS BENNETT. [Specimen taken ten miles from the sea, in Connecticut.]—Auk, VI, p. 199; also at p. 4 of pamphlet reprinted under title 'Abstract of the Proceedings of the Linnæan Society of New York City, for the official year 1888-89.'
1889. BROWN, NATHAN CLIFFORD. Supplementary Notes on Birds of Portland and Vicinity.—Proc. Port. Soc. Nat. Hist., June 14, 1889, p. 39.
Published as a supplement to a reissue of the 1882 list, the erratum on p. 37 being carried forward to p. 40.
1889. DAVIE, OLIVER. Nests and Eggs of North American Birds by Oliver Davie. Third Edition, Revised and Augmented. Introduction by J. Parker Norris. Illustrations by Theodore Jasper A.M., M.D., and W. Otto Emerson. Columbus Hann & Adair. 1889. Svo. p. 298.
This is the first edition that contains mention of *A. princeps*, and later ones, to date, are mere reissues of this.
1889. [SMITHSONIAN report for 1886.] Part II, p. 740.
Among list of donations to the National Museum are thirty specimens of *A. princeps* from Mr. C. W. Chamberlain, Boston, Mass.

1889. T [HOMPSON], E [RNEST] E. Birds of Nova Scotia.— *Auk*, VI, p. 64.
A review of Mr. Andrew Downs's list of birds of Nova Scotia, justly criticising him for omitting the Ipswich Sparrow, "probably without exception the most peculiar and characteristic of the whole Acadian avifauna."
1889. TORREY, BRADFORD. A Rambler's Lease By Bradford Torrey [Two quotations and colophon] Boston and New York Houghton, Mifflin and Company The Riverside Press, Cambridge 1889. 16mo. pp. 131, 132, 133, 136, 137.
1889. TORREY, BRADFORD. December Out of Doors.— *Atlantic Monthly*, LXIV, December, 1889, p. 757; reprinted (with other sketches) in 'The Foot-path Way,' 1892, pp. 53, 54.
1890. DUTCHER, WILLIAM. A Winter Trip to Montauk.— *Forest and Stream*, XXXIV, April 3, p. 206.
Several specimens seen on Amagansett Beach and at Montauk Point, Long Island, N. Y.
1890. MAYNARD, CHARLES JOHNSON. Eggs of North American Birds by Chas. J. Maynard. Illustrated with ten hand-colored plates. Boston: DeWolfe, Fiske & Co. 1890. 8vo. p. 104.
"Authenticated eggs are unknown, but it is supposed to breed on Sable Island, Gulf of St. Lawrence." The geography of this statement is a good deal at fault.
1890. NELSON, JULIUS. Geological Survey of New Jersey. Final Report of the State Geologist. Vol. II. Mineralogy, Botany, Zoology. Trenton, N. J. Printed by the John L. Murphy Publishing Company, 1890.— Descriptive Catalogue of the Vertebrates of New Jersey. (A revision of Dr. Abbott's Catalogue of 1868.) Prepared by Julius Nelson, Ph.D. 8vo. p. 541.
1890. RIVES, WILLIAM CABELL, JR. A Catalogue of the Birds of the Virginias.— *Proc. Newport Nat. Hist. Soc.*, Document VII, 1889 90, p. 73.
First record for Virginia,— "common in winter at Cobb's Island."
1890. [SMITHSONIAN report for 1888], pp. 146, 744.
Fourteen specimens of *Ammodramus princeps* obtained by exchange from C. W. Chamberlain, Boston, Mass.
1890. WORTHINGTON, WILLIS WOODFORD. The Ipswich Sparrow in Georgia.— *Auk*, VII, pp. 211, 212.
First record for Georgia. Cf. *Abstr. Proc. Linn. Soc. N. Y.*, p. 9, 1890 (repetition in part of original record); *Zoologischer Anzeiger*, XIII, p. 672, 1890; Brewster, *Auk*, X, p. 302, 1893 (duplication of Mr. Worthington's record); Brewster, *Auk*, X, p. 365, 1893 (explanation of the double record); *Zoologischer Anzeiger*, XVI, p. 539, 1894.
1891. BOLLES, FRANK. The Equinoctial on the Ipswich Dunes.— *Atlantic Monthly*, LXVIII, October, pp. 524-525; reprinted with other sketches in 'Land of the Lingering Snow' (1891), pp. 67, 68.
1891. BOLLES, FRANK. Land of the Lingering Snow Chronicles of a Stroller in New England from January to June By Frank Bolles [colophon] Boston and New York Houghton, Mifflin and Company The Riverside Press, Cambridge 1891 16mo. pp. 67, 68, 88.

1891. CHAMBERLAIN, MONTAGUE. A Popular Handbook of the Ornithology of the United States and Canada, Based on Nuttall's Manual. By Montague Chamberlain. [Vignette] Vol. 1. The Land Birds. Boston: Little, Brown, and Company. 1891. Svo. p. 326.
1891. CHAMBERLAIN, MONTAGUE. A Popular Handbook of the Ornithology of Eastern North America. By Thomas Nuttall. Revised and Annotated by Montague Chamberlain. [Vignette] Vol. 1. The Land Birds. Boston: Little, Brown, and Company. 1891.
The original two volumes are here bound together in one, the preface is rewritten, and the work retitled.
1891. WALTER, HERBERT EUGENE. The Birds of Androscoggin County. By Herbert E. Walter. Notes on the Perching Birds of Androscoggin County, supplemented by a Catalogue of Other Species, excluding the shore and water birds, also identified in the county. Svo. pamphlet, reprinted from 'History of Androscoggin County,' p. 25.
Among the species found elsewhere in Maine, but *not* in Androscoggin County.
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