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THE BLACK-CROWNED NIGHT HERON (NYCTICORAX  
NYCTICORAX NAEVIUS) OF SANDY NECK.

BY ALFRED O. GROSS.

*Plates I and II.*

INTRODUCTION.

WHEN one looks across Barnstable Bay, Massachusetts, from the low-lying hills which border the beautiful highway of Cape Cod between Barnstable and Yarmouth, he can see Sandy Neck, a long arm of sand dunes stretching off to the north and east into Cape Cod Bay for a distance of several miles. The eastern end of this neck is marked by a lighthouse which guards the entrance of Barnstable Bay and which has guided the fishermen's boats up the channel for more than a hundred years. As you follow the barren sandy waste to the westward the eye is attracted by the rugged contour of a series of high wind-swept hills, the glistening white sand of which stands out in striking contrast with the dark green of the pitch pines clustered among the dunes. Located in these pines is one of the largest colonies of Black-crowned Night Herons in America. This colony may be approached from the west via West Barnstable, but by far the best and most convenient way is to secure a boat at Yarmouthport and take the refreshing sail across Barnstable Bay to the group of summer homes nestled

around the lighthouse. If you cross at low tide you gain a striking impression of the miles of salt marshes, the feeding grounds par excellence of the Herons. As the boat thugs along the narrow channel out of Yarmouthport you may see the Bitterns stalking in the tall grass and out in the more open places and even on the exposed mud flats, dozens of Night Herons and an occasional Green Heron so busily engaged in their feeding operations that they give no heed to the boat or the noise of the engine. As you approach the lighthouse you are greeted by the shrill cries of Terns and you may see hundreds of Gulls rising as a cloud from their feeding grounds.

It was my good fortune to be able to secure a most attractive cottage camp owned by a well-known fisherman of the Cape, Mr. Shirley Lovell, to whom I am greatly indebted for many courtesies received during my stay at Sandy Neck. The first week of my visit was made doubly enjoyable by having as guests, Mr. Herbert K. Job and Rev. William C. Prentiss of New Haven, Connecticut, and Dr. Philip H. Pope of Reed College. Mr. Job, a representative of the National Association of Audubon Societies, secured a valuable series of motion pictures of this most interesting of all Night Heron colonies.

According to the accounts of the fishermen, the Herons were inhabiting the trees of Sandy Neck when the lighthouse was established over a century ago, and doubtless the ancestors of these birds were rearing their young among the sand dunes long before the Pilgrims landed at Provincetown and settled at Plymouth. Though the Herons have inhabited this place for such a long time the location of the colony is continually shifting. In the past ten years the birds, because of fires, cutting of trees or other disturbances have, according to Mr. Lovell, changed their nesting sites three times. The present location is near the north shore of the "Neck" about two and a half miles from the lighthouse. There is no road, not even a trail which leads from the camp to the colony, so it is necessary to pick your way over the sand dunes or else choose the longer but better way around the beach of the north shore. These barren and seemingly desolate sand dunes over which I made my daily journey did not lack in objects of interest to the biologist. Even the unattractive surroundings

of the camp did not discourage several birds which became my intimate companions during the summer. A Barn Swallow built her nest under the eaves of my porch and successfully reared her brood of young. In masses of sea-weed lodged among tufts of beach-grass not more than one hundred yards from the camp were three nests of the Spotted Sandpiper. Two of these nests when found contained four eggs each, and the other had the unusual set of eight, probably the eggs of two females. A nest with four eggs of the Piping Plover was discovered by the lighthouse keeper on June 29, and during July it was an almost daily experience to see the downy young of the Plovers and Sandpipers running over the sand and being cared for by the solicitous parents, who devised every means and cunning to lure one away, and who dared any danger to protect their young.

In June the dull gray tones of the barren sands were enriched by the golden yellow blossoms of innumerable tufts and patches of the beach heather (*Hudsonia tomentosa*). In places sheltered from the winds and the shifting sands there was an abundance of coarse beach-grass and on the lower levels, especially near the salt water, the tufts of grass were intermingled with luxuriant clusters of purple blossoms of the beach pea (*Lathyrus maritimus*). In July the mats of heather became brown, but the loss of the bright June blossoms was then replaced by myriads of golden asters (*Chrysopsis falcata*) which sprung up like magic among the waving blades of grass. After walking about a mile over the scantily clad sand dunes to the westward, in the direction of the Heron colony, you meet with rather large areas of bayberry and beach plum, many of which are interwoven with an impenetrable tangle of woodbine and poison ivy. A nest and four eggs of the Catbird were found in one of the smaller clusters of bayberry and doubtless other birds, such as Brown Thrashers, Yellow-throats, Kingbirds, Song Sparrows and Red-winged Blackbirds, which were always in evidence about this shrubbery, were nesting nearby in similar situations.

There were numerous small fresh water ponds and cranberry bogs in the hollows among the dunes which provided an ideal breeding place for Fowler's toad, as well as for myriads of troublesome mosquitoes. The toads and larvae were freely used by the

Hérons and it was not an uncommon sight to see several beautifully plumed birds standing at the edge of one of the pools all primed for the unsuspecting prey.

The north beach, a course often chosen for the walk to and from the Heron colony, was strewn with numerous shipwrecks. The skeleton of a large boat cast on the shore by a storm about ten years ago, is almost opposite the Heron colony and served as a guide in readily locating the colony when approaching it from Cape Cod Bay. There is one wreck, not more than twenty years old, which is almost covered with sand and is now more than a hundred yards from high tide mark. The lighthouse when it was first built stood at the extreme end of the "Neck," but it is now a long distance inland. This all gives us evidence of the plastic nature of the Neck and of the ever-changing nature of its contour.

On certain days, at the proper stage of the tide, thousands of Herring Gulls and Terns and many Laughing and Black-backed Gulls found the mud flats on the north shore, which at low tide extended out into the bay for about two miles, a favorite fishing ground. At low ebb, at most any time of the day, but especially at night, the Herons patronized these flats in large numbers. Though the Herons found much here to interest them, it was the extensive grassy salt-marshes of Barnstable Bay that have determined the presence and continued prosperity of the immense heronry at Sandy Neck.

Long before the colony is reached its location may be readily ascertained, not only by the Herons flying to and from the nests, but also by the incessant din of innumerable calls of young and old birds. Mounting one of the high sand dunes overlooking the tops of the trees, you gain an inspiring view of the many beautiful black and white birds, which in the sunshine stand out so prominently in outline against the dark background of the pines. The number of birds seen from such a view is impressive, but it is not until you have lived among the birds for weeks and have had a chance to examine every one of the inhabited pines that you can appreciate the really large number of Herons. A census, the details of which are given in a subsequent section of this paper, reveals that there were not less than nine thousand five hundred individuals in this Night Heron metropolis. The results of an

intensive study of this unusual heronry made at the height of the breeding season during June and July, 1920, constitute the major part of the subject material of this paper, but studies made at various colonies in Illinois and in Maine are also included. The author has made free use of correspondence and has quoted liberally from many of the excellent published papers and notes written by observers in different sections of America in order to assemble the essential and interesting features in the Life History of the Black-crowned Night Heron.

#### NAMES.

A conspicuous and striking bird, such as the Black-crowned Night Heron, is destined to be the recipient of numerous common names. In the north and in localities where it is not to be confused with the Yellow-crowned Night Heron it is frequently called the Night or the American Night Heron. In places where the bird is abundant the layman, if he does not know a recognized name, may devise one and make use of some striking characteristic habit or note of the bird, or else some feature of its anatomy. One of the most widely used common names is 'Quawk,' which, when properly pronounced and accented is an imitation of one of the calls of the adult Heron. There are numerous variations of this same name—in Maine<sup>1</sup> and in various states of the Middle West<sup>2, 3</sup> it is 'Squawk,' at Sandy Neck the fishermen call it 'Quark' and in other localities it is 'Quak,'<sup>4</sup> 'Quaw-bird,'<sup>5</sup> 'Qua-bird'<sup>1, 3, 6, 7, 14</sup> and 'Kwah-bird.'<sup>14</sup> If you speak about the Black-crowned Night Heron to any fisherman along the New England coast, he will generally give you a blank stare, but if you mention the name 'Quawk' or something like it he brightens up and tells you many interesting things about this bird.

In the Middle West, the names 'Night Raven'<sup>3, 6, 8</sup> and 'Lake Owl'<sup>8</sup> are used because of its nocturnal habits, and in Florida, for

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<sup>1</sup> Knight, O. W., 1908, *Birds of Maine*, p. 134.

<sup>2</sup> Barrows, W. B., 1912, *Michigan Bird Life*, p. 146.

<sup>3</sup> Jones, Lynds, 1903, *The Birds of Ohio*, p. 56.

<sup>4</sup> Woodruff, F. M., 1907, *Birds of Chicago Area*, p. 56.

<sup>5</sup> Stone, W., 1913, *Auk*, vol. 30, p. 336.

<sup>6</sup> Widmann, O., 1907, *A Prem. Cat. of the Birds of Missouri*, p. 55.

<sup>7</sup> Butler, A. W., 1897, *The Birds of Indiana*, p. 666.

<sup>8</sup> Anderson, R. M., 1907, *The Birds of Iowa*, p. 200.

similar reasons the natives dub it the 'Night Scrooglin.'<sup>9</sup> In certain localities of Georgia, it is given the rather appropriate name of 'Red Eye.'<sup>10</sup> Dr. Charles Wendell Townsend<sup>11</sup> states that the Ipswich gunners call this Heron the 'Dispar Goose.' Apparently this name is very local, for I have never met with it and Dr. Townsend states he has never known it to be applied to this bird elsewhere.

Audubon wrote, that in South Carolina this Heron was called 'Indian Pullet,' in lower Louisiana 'Gross-bec,' and in east Florida it was generally recognized as the 'Indian Hen.' Maynard<sup>12</sup> states that in eastern North America the name 'Gobly-gossit' was frequently applied to this bird. In the Hawaiian Islands the adult is known as the 'Auku Kohili' and the young as 'Auku' or 'Speckled Heron.'<sup>13</sup> In the West Indies Islands it is variously known as 'Dry Heron,' 'Golden,' 'Guinea Hen' and 'Spotted Heron.' The latter names are applied to the first and second year birds which have the streaked plumage.

#### GEOGRAPHICAL RANGE.

The Black-crowned Night Heron (*Nycticorax nycticorax naevius*) of America, differs from that of Europe only subspecifically. The genus may be considered cosmopolitan, as it is represented in all parts of the world where conditions for Herons are favorable.

In America, the northern range of the sub-species *naevius* extends from Nova Scotia,<sup>1</sup> New Brunswick,<sup>2, 3</sup> Quebec,<sup>4, 5, 10</sup> Ontario,<sup>4, 6, 8, 11, 12</sup> and Manitoba,<sup>4, 7</sup> to British Columbia.<sup>9</sup> Not

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#### Notes to "Names."

- <sup>9</sup> Baynard, O. E., 1913, Auk, vol. 30, p. 243.  
<sup>10</sup> Wright, A. H. and Harper, F., 1913, Auk, vol. 30, p. 503.  
<sup>11</sup> Townsend, C. W., 1905, Birds of Essex County, pp. 156-158.  
<sup>12</sup> Maynard, C. J., 1882, Birds of Eastern North America, p. 417.  
<sup>13</sup> Bryan, W. A., 1901, Auk, vol. 18, p. 385.  
<sup>14</sup> Chamberlain, M., 1897, Nuttall's Ornithology, p. 92.

#### Notes to "Geographical Range."

- <sup>1</sup> Downs, A., 1887, Catalogue of Birds of Nova Scotia.  
<sup>2</sup> Chamberlain, M., 1887, A Catalogue of Canadian Birds.  
<sup>3</sup> Philipp, P. B. and Bowdish, B. S., 1919, Auk, vol. 36, p. 37.  
<sup>4</sup> Macoun, J., 1900, Catalogue of Canadian Birds, p. 134.  
<sup>5</sup> Mousley, H., 1918, Auk, vol. 35, p. 85. Ibid p. 297.  
<sup>6</sup> Fleming, J. H., 1901, Auk, vol. 18, p. 36.  
<sup>7</sup> Seton, E. T., 1909, Fauna of Manitoba, p. 491.  
<sup>8</sup> Watson, C. W., 1920, Bird Lore, vol. 22, p. 98.

all of the records above necessarily define a northern breeding range of the Night Heron for it is well known that these birds may make long and erratic flights north from their nesting sites especially at the close of the breeding season. There are however nesting records from the following places which establish at least approximately the northern limits of the breeding range: New Brunswick (?),<sup>3</sup> Quebec,<sup>4, 16</sup> Ontario,<sup>4, 20</sup> Manitoba<sup>4, 7, 19</sup> South Dakota,<sup>18</sup> Wyoming,<sup>17</sup> Oregon,<sup>13, 14</sup> and Washington (?).<sup>15</sup>

There are innumerable records of its breeding southward throughout North America.<sup>21</sup>

#### MIGRATION.

In our southern states where the Black-crowned Night Heron is represented by individuals throughout the year the first nests are built during the month of March. In Florida the first nests may usually be found the first week of March, which is according to Mr. O. E. Baynard,<sup>1</sup> a much earlier date than that of the nesting time of other species of Herons. The earliest record in Mississippi as recorded by Mr. O. R. Stockard<sup>2</sup> is March 21, 1895, and the latest May 11, 1897.

The vanguard of the Night Herons in the Spring migration usually reaches New England during the first week of April but there are occasional records of daring individuals which brave the chill March winds to make an early return to their haunts in the north. Dr. Townsend informs me that he saw two birds at Ipswich, Massachusetts, in the Spring of 1921 as early as March 20;

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#### *Notes to "Geographical Range."*

- <sup>9</sup> Brooks, A., 1909, *Auk*, vol. 26, p. 60.
- <sup>10</sup> Dionne, C. E., 1889, *Catalogue of the Birds of Quebec*.
- <sup>11</sup> MacIlwraith, T., 1894, *Birds of Ontario*.
- <sup>12</sup> Raine, W., 1892, *Bird Nesting in Northwest Canada*.
- <sup>13</sup> Finley, W. L., 1906, *Condor*, vol. 8, pp. 35-40.
- <sup>14</sup> Finley, W. L., 1912, *Bird Lore*, vol. 14, p. 415.
- <sup>15</sup> Bowles, J. H., 1911, *Auk*, vol. 28, p. 170.
- <sup>16</sup> Wintle, E. E., 1896, *The Birds of Montreal*.
- <sup>17</sup> Grave, B. H. and Walker, E. P., 1913, *The Birds of Wyoming*, p. 31.
- <sup>18</sup> Visher, S. S., 1913, *Auk*, vol. 30, p. 565.
- <sup>19</sup> Seton, E. T., 1886, *Auk*, vol. 3, p. 150.
- <sup>20</sup> Eifrig, G., 1909, *Auk*, vol. 26, p. 59.

#### *Notes to "Migration."*

- <sup>1</sup> Baynard, O. E., 1913, *Auk*, vol. 30, p. 243.
- <sup>2</sup> Stockard, O. R., 1905, *Auk*, vol. 22, p. 148.

the earliest previous record was March 27. The great mass of birds, however, do not reach the state until the middle of April, and in Maine it is the latter part of the month or the first week of May before we can reasonably expect to see them in large numbers at the rookeries. The average date of unpublished records made by Mr. A. H. Norton, of birds first seen at Portland, Maine, from 1885 to 1918 is April 17. The following records of arrivals at Philadelphia, Pennsylvania,<sup>1</sup> made by William Bartram about a hundred years ago are of interest:

1802	April 15	1805	April 23	1822	May 4
1803	April 7	1820	April 13		

In 1884 in collecting data for his book, 'Migration in the Mississippi Valley' Mr. W. W. Cooke<sup>2</sup> received his first record of the Black-crowned Night Heron from Rodney, Mississippi, on March 22 "where they were heard squaking at night as they flew over the city. On April 5 they appeared at Laporte City, Iowa, and two days later came to Heron Lake, Minnesota, which is the summer home of great numbers." This report probably typically represents the progress made by this bird up the Mississippi Valley during the Spring migration.

In Missouri,<sup>3</sup> the average date of arrival is April 10; at Philo, Illinois,<sup>4</sup> the Herons usually arrive April 20-25, and the average date of first arrivals during ten years of observations at Atwood, Illinois, is April 21. They arrive at the rookeries in Oregon about the middle of April, so the migration wave of the Herons is comparatively uniform across the entire continent.

The departure of these birds in the autumn seems to be less regular and more erratic than their coming in the Spring. In Maine most of the rookeries are often deserted by the first of October, but in the Fall of 1920 the birds did not leave the Whale-boat Island colony until November 12, and a pair of the birds remained until December 15, which is, as far as I know, the latest record of these birds in Maine. Mr. A. H. Norton's latest records of birds last seen at Portland, Maine, are as follows:

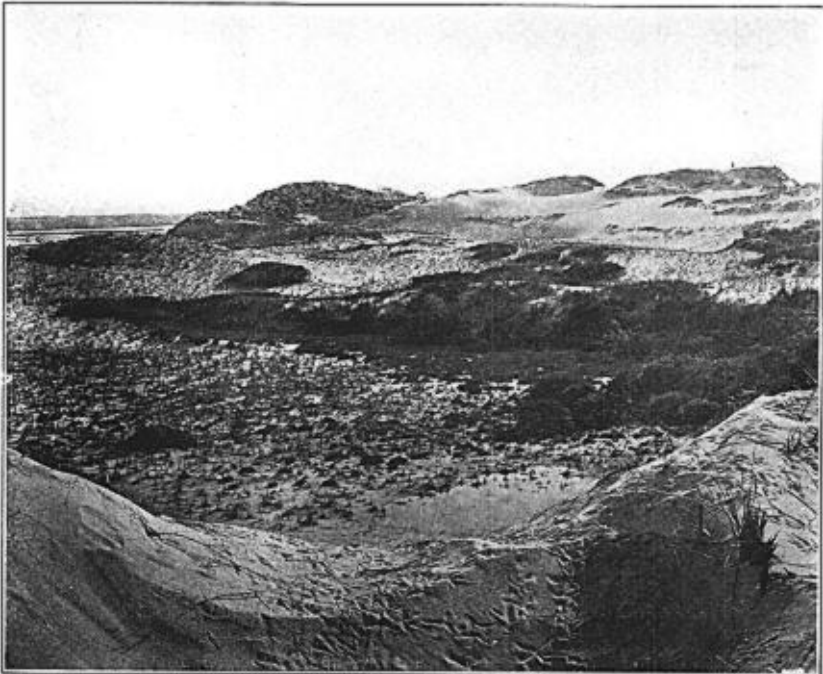
<sup>1</sup> Stone, W., 1913, Auk, vol. 30, pp. 325-358.

<sup>2</sup> Cooke, W. W., 1884, Bird Migration in the Mississippi Valley, p. 84.

<sup>3</sup> Widman, O., 1907, Preliminary Catalogue of Birds of Missouri, pp. 55-56.

<sup>4</sup> Hess, I. E., 1910, Auk, vol. 27, p. 21.





SANDY NECK, NEAR BARNSTABLE, MASS.

1. Night Heron rookery, from top of sand dunes, Cape Cod in the distance.
2. Dunes east of rookery, Heron tracks in sand where they gathered beach-grass roots for their nests,

October 7, 1885; October 10, 1898; October 18, 1916. In 1920 the bulk of the birds left the colony at Sandy Neck on November first, but several birds were seen at the rookery until December 15, the same date as that of the last ones reported at Whaleboat, Maine. This year, 1921, Mr. Shirley Lovell writes that birds were present in large numbers on September 12, but the place was entirely deserted on the following day, and none have been seen up to the time of writing October 1.

I know of no winter records of the Night Heron in Maine unless that of December 15, 1920, is considered as one. Winter records of these birds are not rare in Massachusetts, Connecticut and New York, and they regularly pass the winter in the States from Virginia southward.

Very interesting dispersals of the Herons from the rookeries at the close of the nesting season have been revealed by banding, a work which is yielding such profitable and important results with various species of birds. The dispersal of many of the Night Herons, especially the young, takes place in a northerly direction quite the opposite of what we had formerly supposed, and Dr. L. J. Cole<sup>1</sup> concludes, it is not to be inferred that because young birds appear in a certain locality in Autumn they have necessarily come from the north. A large number of our northern range records are of young birds, but as has already been stated, under geographical distribution, the nesting range does not necessarily coincide with the distribution of the young birds reported. The following are some of the banding returns of the Black-crowned Night Heron which have come to my attention.

Banded July 8, 1909, at Barstable, Massachusetts, shot at Goat Island, Cape Porpoise, York county, Maine, September 11, 1909, distance 120 miles north.

Banded July 8, 1909, at Barstable, Massachusetts, found on the marshes at Seabrook, New Hampshire, September 17, 1909, distance 90 miles northwest.

Other Herons banded at Barnstable between June 21 and July 8 were recovered at Wellfleet, East Orleans, Minot, Holliston and Berkley, Massachusetts, distances ranging from only 15 to 70

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<sup>1</sup> Cole, L. J., 1910, *Auk*, vol. 27, pp. 153-168.

miles but all in a more or less northerly direction from the colony at Barnstable where they were banded.

The following returns were made of Herons banded June 17, 1922 at Barnstable, Massachusetts, (presumably the same colony noted above) by L. B. Fletcher and other members of the New England Bird Banding Association. The first return was of a Heron found dead on August 7 at Kennebunkport, Maine, 120 miles due north. A second Heron was taken August 20, 1922, at Fryeburg, Maine, 200 miles north and on September 4, another was picked up dead, at Beach Bluffs, between Swampscott and Marblehead, Massachusetts, about 60 miles to the northwest of the point where it was banded.

Mr. Paul Bartsch obtained similar results from the young Herons which he banded at a colony near Washington, D. C. A Heron banded in the summer of 1902, was shot September 24 of the same year at Abington, Maryland, 55 miles northeast from the colony. Three returns were made of birds banded in 1903. One was shot at Pennsville, New Jersey, July 18, 1903, one was captured July 19, in a street in Leesburg, Virginia, and the third was caught July 20 in a fish trap on the Potomac River.

Dr. John C. Phillips has kindly given me the following unpublished banding returns of Black-crowned Night Herons he banded at a colony at Wenham, Massachusetts.

A Heron banded June 13, 1915, was picked up in a dying condition at Masonville Station, Province of Quebec, November 8, 1915, and another banded June 3, 1915, at Wenham, Massachusetts, secured at Seabrook, New Hampshire, September 18, 1915.

The above striking examples taken from three places of dispersal and at widely separated times are I think conclusive evidence that there is a more or less regular movement of young birds to the northward at the close of the nesting season, and that many of the birds secured in the autumn along the northern limits of the summer range are birds which may have been reared in colonies located to the southward.

#### BREEDING PLACES.

The Black-crowned Night Heron is a gregarious and social bird breeding in colonies and but rarely building its nest in a situation

remote from those of its fellows. The size of the colony may vary from two or three pairs of birds to several hundred or even thousands of individuals. It is essentially a maritime bird in the states bordering the coast. There are in New England, especially in Maine, hundreds of inland lakes with a diversity of excellent nesting sites and feeding grounds, but as attractive as they seem to be they seldom lure the Night Heron away in great numbers from the roosts and rookeries near the clam flats and salt marshes.

In Maine, spruce-covered islands or dense groves of conifers on the mainland near the salt water are the places where one is most likely to meet with success in locating the largest breeding places and roosts. In this state there are at present thriving colonies at Barred Island and Allen's Island in the Penobscot Bay region; Whaleboat Island and Birch Island in Casco Bay and on the mainland at Scarborough Beach and at the head of Maquoit Bay near Brunswick, Maine. The colony at Falmouth about which so many reports have been made in the past is now deserted. Mr. A. H. Norton of the Portland Natural History Society visited Allen's Island in June 1921 and found there a rookery comprising about one hundred Great Blue Herons and nearly four hundred Black-crowned Night Herons. It is probable this colony has received contributions from various islands in the region, such as Metinicus, No Mans Land and others, which were formerly inhabited but recently deserted. The nests on Allen's Island were built at an average height of 25 feet in the low spruce trees which there do not exceed 30 to 40 feet in height. The majority of the nests were supported by the lower branches of the green conical tops so that they were in plain view to an observer standing on the forest floor. Several Ravens were seen at this colony and Mr. Norton thinks some of the dead half-eaten young that were lying on the ground represented the work of these black marauders. The colony at Whaleboat Island which contained only thirty pairs of Herons in 1915 has increased to a thriving community of more than two hundred fifty birds, not including about fifty Great Blue Herons which regularly nest there. The nests seen here were without exception built in the tall dead spruces, those of the Night Heron at an average height of 34 feet from the ground. None of them were lower than 10 feet and one was built near the top of a

tall spruce more than 60 feet in height. At this place there seemed to be a rough correlation between the height of the trees and the position of the nest. The majority of the nests were nearly the same distance from the top of the respective trees, a place where the densely branched limbs were best adapted for holding the nest. They were built near the trunk and were usually supported by the bases and smaller lateral branches of two or more horizontal limbs. With very few exceptions the spruce trees on Whaleboat Island are dead. The same has been the fate of other groves which have been occupied by the Herons during the breeding season. It has occurred so often in the case of both hard wood and coniferous trees and in so many localities that some observers are inclined to believe that the trees are at least retarded in growth if not killed by the limey deposits, which in some instances so completely cover the foliage and ground as to give the whole a whitewashed appearance. It is probable that the death of certain trees is hastened because of these excretions, but in the case of at least one colony, according to Mr. Norton, the emigration of the Herons was coincident with an attack on the trees by myriads of moths commonly known as the spruce bud Tortrix (*Tortrix fumiferana*). Here the Herons were innocently blamed for the damage primarily caused by an insect. I am inclined to believe the same may be true of the spruces on Whaleboat Island where all of the trees, some of which were probably never occupied by the Herons, are dead. Furthermore certain other plants growing underneath the trees of the colony seem to thrive best where the onslaught of lime is the greatest. For example, when I visited Whaleboat Island last August, the red raspberries directly under the Herons had the largest and finest fruit I have ever seen, not excepting the carefully cultivated ones in my garden. Certainly the relation of the excretions of the Herons to the death of the trees is open for further investigation.

Several large colonies have been reported from Massachusetts, but at the present time there are two that eclipse all others, at least from the standpoint of numbers. Dr. Chas. Wendell Townsend<sup>1</sup> has reported a colony which he found in a grove in the Ipswich

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<sup>1</sup> Supplement to the Birds of Essex County, Aug., 1920.

dunes east of Wigwam Hill. This colony which contained only 25 nests in 1916, increased its numbers to 167 in 1917 and according to another careful census made in 1918 its numbers had reached 761 nests located in 492 trees. In a recent letter received from Dr. Townsend, he states he has made no census since 1918, but he thinks the numbers are still increasing. The other large colony in Massachusetts to which I have already referred is the one on Sandy Neck near Barnstable. My attention was first called to this colony by Mr. A. C. Bent who introduced it to me as a most admirable place for an intensive study of these birds. It has certainly proven to be this beyond my greatest expectations. About 90 per cent of the nests of this colony were built in low pitch pines, and the remainder were in scrub oaks, maples and a few in the bayberry and alder bushes which grew in the lower swampy portions of the grove. The height of the nests varied from one in a bayberry bush 2 feet above the water to one 42 feet high in one of the larger pines. The average height of 100 nests, which were carefully measured, was 22 feet, 4 inches. These nests unlike those in the spruce groves of Maine were generally located on the forked tips of the large branches and a considerable distance from the main trunk of the tree (Plate II, Fig. b). A detailed census was made of this rookery for purposes of comparison with other colonies of the country or with the same colony at some future date.

In making this census each tree was marked as soon as the nests were counted in order to reduce to a minimum, errors of omission or of duplication. The results of this census, made June 22-23, 1920, are shown in the following table:

TABLE I.

Number of nests in each tree	Number of trees containing respective number of nests	Total number of nests
1	282	282
2	179	358
3	118	354
4	80	320
5	86	430
6	43	258
7	35	245

TABLE I (Continued).

Number of nests in each tree	Number of trees containing respective number of nests	Totals number of nests
8	13	104
9	7	63
10	4	40
11	5	55
12	0	0
13	1	13
14	1	14
Total		2536 nests

It was impracticable to examine the contents of all the 2536 nests, but those of 100 occupied trees, taken in groups of ten from as many representative portions of the colony were chosen to represent approximate conditions. In these 100 trees there were 292 nests, the contents of which were as follows:

- 57 nests contained 179 eggs
- 11 nests contained 18 eggs and 15 young
- 199 nests contained 547 living young
- 3 nests contained only dead young
- 22 nests were deserted.

The eggs of the 57 nests were distributed as follows:

Number of eggs per nest	1	2	3	4	5	Total
Number of nests containing respective number of eggs	2	11	23	19	2	57 nests
Total	2	22	69	76	10	179 eggs.

The young of the 199 nests were distributed as follows:

Number of young per nest	1	2	3	4	Total
Number of nests containing respective number of young	6	64	103	26	199 nests
Total	6	128	309	104	547 young

Including the nests in which there were both young and eggs, there were in the 292 nests of the one hundred trees, 197 eggs and 562 young. These trees and the number of nests they contained were fairly representative, hence it is conservative to estimate

that on June 22-23, 1920, there were in the 2536 nests of the colony, approximately 1700 eggs and 4800 young. There were at least 2300 occupied nests, which indicates that there were not less than 4600 adult nesting birds. As nearly as I could determine there were about 100 birds of the first and second summer plumages which were not nesting. If all the young and adult birds are included, the colony at this time contained at least 9500 individuals. Is it any great wonder that the noise of the rookery can be heard for a great distance when there are over nine thousand voices which may be joined in one grand pandemonium of calls and shrieks? An estimate of the relative number of eggs and young made a month later revealed that there were less than 400 eggs, while the young had passed the six thousand mark. Many of the young at this time were able to fly short distances and fully 70 per cent of them could leave the nests and perch upon the branches of the trees.

In 1904, Mr. S. W. Bailey<sup>1</sup> found a flourishing colony of 700 birds on Plum Island lying off the northeast coast of Massachusetts. The nests were placed six to thirty feet from the ground in trees of shad, poplar, maple and elm, with fewer numbers in oak and tupelo. According to Mr. Bailey, however, Plum Island was deserted in 1909; the birds for some reason having gone elsewhere to breed.

Dr. Frank M. Chapman describes a very interesting colony of 525 nests which he visited in 1899 at Roslyn, Long Island, within twenty miles of New York City.<sup>2</sup> The nests were placed in tall slender swamp maples, all within a limited radius of fifty yards. The lowest nests were thirty feet and the highest were at least eighty feet from the ground. According to Mr. Gilbert T. Pearson,<sup>3</sup> the numbers of this colony have steadily decreased to 250 in 1907, 200 in 1908 and in 1910 he found only 25 birds. Mr. Pearson also lists all the colonies of Black-crowned Night Herons known by him to be within two hundred miles of New York City. Mr. Chapman found two colonies of several hundred birds in

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<sup>1</sup> Bailey, S. W., 1915, *Auk*, Vol. 32, pp. 424-441.

<sup>2</sup> Chapman, F. M., 1900, *Bird Studies with a Camera*, pp. 76-85.

<sup>3</sup> Pearson, T. G., 1912, *Bird Lore*, vol. 14, pp. 70-73.



swamp maples on Gardner's Island.<sup>1,2</sup> Paul Bartsch<sup>6</sup> gives a very complete account of three colonies in the District of Columbia. The nests of the birds in these colonies, according to Dr. Bartsch, were built in dense pine coppices. Mr. P. B. Philipp<sup>7</sup> reports a very unusual colony at Secessionville, South Carolina, which was located on an island about three acres in area. It was grown up with dense patches of bay and sparkleberry bushes and cabbage palms, interspersed with spaces of salt grass and prickly pear, the whole bordered with a strip of salt marsh. In this heterogeneous resort there were two hundred pairs of Green Herons, one hundred pairs of Little Blue Herons, three hundred pairs of Louisiana Herons and 25 pairs of Black-crowned Night Herons. All the nests were between 2 and 15 feet from the ground. In Florida<sup>3, 4, 5</sup> and the Gulf states<sup>8</sup> the Night Herons generally resort to the cypress swamps for their nesting sites.

I have visited seven colonies of the Night Herons in Illinois, the majority of which were located in hard wood trees of the floodal plains along the small tributary streams of the Wabash, Illinois and Mississippi Rivers. All these colonies were small, the largest not exceeding 40 nests. On a farm near Atwood, Illinois, the birds selected an old apple orchard for their nesting site. They came to this place year after year but in 10 years (1899-1909) that I observed them the number of nests built during any one season never exceeded a dozen. The small size of this colony was not due to any lack of protection on the part of the owner of the orchard for he as well as his neighbors did all they could to encourage these birds which they thought were destined to bring them good luck. Neither was its failure to grow in numbers to be attributed to an absence of nesting sites, for there were numerous groves and orchards seemingly as desirable as the place selected. It is not probable that the progeny of these birds went elsewhere, for there

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<sup>1</sup> Chapman, F. M., 1908, *Camps and Cruises of an Ornithologist*, p. 45.

<sup>2</sup> Chapman, F. M., 1903, *Bird Lore*, vol. 5, p. 179.

<sup>3</sup> Kennard, F. H., 1915, *Auk*, vol. 32, pp. 3-4.

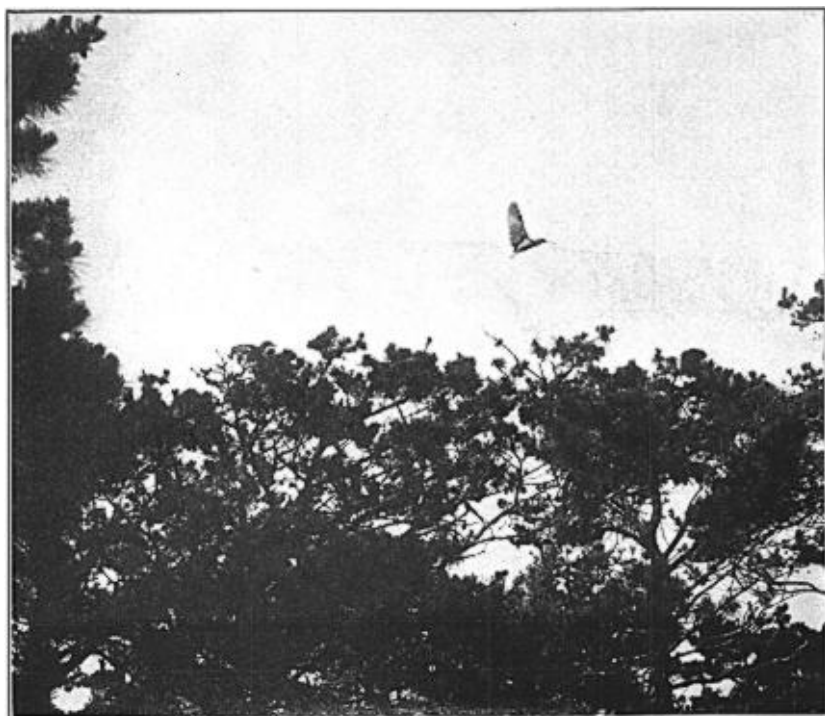
<sup>4</sup> Baynard, O. E., 1913, *Auk*, vol. 30, p. 243.

<sup>5</sup> Williams, R. W., 1904, *Auk*, vol. 21, p. 452.

<sup>6</sup> Bartsch, Paul, 1903, *Smithsonian Misc. Collections*, pp. 104-110.

<sup>7</sup> Philipp, P. B., 1910, *Auk*, vol. 27, pp. 305, 306.

<sup>8</sup> Golsan, L. S. and Holt, E. G., 1914, *Auk*, vol. 31, p. 217.



SANDY NECK ROOKERY

1. Tops of pine trees occupied by the Herons.
2. Interior of rookery; nine occupied nests in one tree. June 23, 1920.

were no other colonies as far as I know within ten miles of Atwood. I think that the available food supply more than any other factor controlled the size of this colony. In hot dry seasons in central Illinois when all the ponds and small streams in the vicinity were dried up, these birds were often severely taxed to provide a living for themselves and young. In such colonies the yearly increase does not exceed but merely balances the death rate.

The nests of all the colonies so far noted have been in trees or shrubs, but in certain localities of America, especially in the west, the Night Heron does not limit itself to the woodlands for a place to build its nest. In these places it clings to what may be a more primitive habit of nesting in marshes on or near the ground. E. W. Nelson<sup>1</sup> found about 50 nests at Grass Lake, Lake County, Illinois, which were built in dense bunches of rice and placed upon the stiff stalks of rice and cane of the year before.

In Wisconsin<sup>2</sup> nests have been found among cane (*Phragmites*) and in Minnesota<sup>3</sup> among quill reeds and bullrushes. Mr. Frank Chapman reports finding them nesting in reed stalks 2 or 3 inches above water in a marsh near Shoal Lake, northwest of Winnipeg, Manitoba.<sup>4</sup> Robt. B. Rockwell<sup>5</sup> in his excellent paper on the Black-crowned Night Heron describes several interesting colonies from diverse localities. In 1916 he found a colony of 150 nests located in a cat-tail swamp near Barr 19 miles northeast of Denver, Colorado. The nests were large and clumsy yet well built structures of coarse sticks and weed stalks ranging in height from six inches to three feet above the ground. Again in 1917 he found a colony the nests of which were level with the surface of the water and were supported by masses of floating dead vegetation anchored in place by a few upright dead cat-tail stalks. These nests the author states were beautifully built affairs of slender twigs and weed stalks, very large, bulky, deeply cupped and quite symmetrical. Being far out from shore upon the open water they were conspicuous and easily discernible at a distance of a hundred yards.

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<sup>1</sup> Nelson, E. W., 1876, Bull. Essex Inst., vol. 8, p. 131.

<sup>2</sup> Kumlien, and Hollister, Birds of Wisconsin, p. 36.

<sup>3</sup> Roberts, T. S., 1919, Bird Lore, vol. 21, p. 311.

<sup>4</sup> Chapman, F. M., 1908, Camps and Cruises of an Ornithologist, p. 334.

<sup>5</sup> Rockwell, R. B., 1910, Condor, vol. 12, pp. 113-121.

Dr. A. Wetmore<sup>1</sup> saw a number of Night Herons preparing to nest in the rushes at the upper end of Laguna de la Puerta at Lake Burford, New Mexico. In the extreme west along the Pacific coast these Herons build their nests in trees as do their relatives on the opposite side of the continent. Mr. W. L. Finley:<sup>2, 3</sup> reported finding a rookery of about 200 nests in a fir forest south of Portland, Oregon. Mr. Finley states that none of the nests were less than 130 feet up and some were 160 feet high in a colony which he found at the lower end of San Francisco Bay, California. In the summer of 1904 he noted 41 nests of the Great Blue Heron and 28 nests of the Black-crowned Night Heron in a single giant sycamore, 7 feet thick at the base, 120 feet high and with a spread equal to its height. In another tree there were 17 Great Blue and 28 Night Heron nests. In this large colony of 700 nests those of the Night Heron were placed at the very upturned tips of the sycamore limbs or else in the willows and alders at a relatively short distance from the ground. Mr. Finley counted 400 eggs from a single point in a giant sycamore tree which gives some idea of the density of the Heron homes at this unusual rookery. At Alameda, California,<sup>4</sup> according to Mr. O. A. Cohen, the Night Herons roosted and nested in the limits of the town. There the nests were placed in tall cypress trees at an average height of 60 feet from the ground.

From the foregoing account it is apparent that the Black-crowned Night Heron is very adaptable to varying conditions as far as the choice of the nesting site is concerned. Few birds can claim such a diversity of nesting places representing all the conditions from a nest on the ground, or among the reeds a few inches above water, to those in shrubbery or relatively low coniferous and hardwood trees or in the very topmost branches of the giant sycamores and firs of the Pacific coast.

#### FOOD AND FEEDING HABITS.

The available food supply more than any other natural factor determines the existence and continued prosperity of a colony of

<sup>1</sup> Wetmore, A., 1920, Auk, vol. 37, p. 391.

<sup>2</sup> Finley, W. L., 1906, Condor, vol. 8, pp. 35-40.

<sup>3</sup> Finley, W. L., 1907, American Birds, pp. 221-231.

<sup>4</sup> Cohen, O. A., 1900, Condor, vol. 2, pp. 10-12.

Hérons such as the one of nine thousand birds at Sandy Neck, Mass. The local distribution of a bird whose food consists almost entirely of animals derived from the water, is destined to be restricted to those localities in which this kind of food exists in abundance. Most of the colonies of Black-crowned Night Herons, which it has been my privilege to visit in the middle west States have been near fresh water ponds, lakes, sluggish streams or swamps—places where frogs, fish or salamanders could be easily secured. The larger colonies I have studied in New England have been near or directly on the sea coast where the birds have access to acres of salt water marshes and miles of mud flats, an environment which provides an abundance of littoral life as well as suitable places from which the fishing operations of the Herons can be carried on. The data upon which this account concerning the food and feeding habits of the Night Herons is based were secured by field observations and from the examinations of regurgitations of the birds at Sandy Neck. Because of this queer habit of throwing up the contents of their stomach on the least provocation, it was possible to make extensive studies of the food without killing or doing the birds the least bit of injury.

From the tabulations of about one hundred regurgitations it was determined that 80 per cent of the food consisted of fish. Most of the fish which were in a condition to permit identification, were whiting (*Merluccius bilinearis*) herring (*Clupea harengus*) and cunners (*Tautoglabrus adspersus*), common species, and perhaps the easiest for the Herons to obtain in the waters adjacent to the colony. Some of the whiting secured by the birds were comparatively large, weighing 300 to 800 grams, more than half the weight of the birds. In a few cases the fish were so long that after being swallowed the caudal fin projected from the beak. Most of the large whiting were picked up by the birds in a dead or dying condition. On several occasions I saw the beach along the north shore of the Cape literally covered with the dead bodies of fish, chiefly the whiting. At such times there were hundreds if not thousands, of Gulls present but the Herons also received their share of the loot. A few small flounders, an occasional mackerel and even such seemingly unedible creatures as the sculpin, puffers and sea-robins were taken by the birds when they were probably

hard pressed for food. Some of the latter fish as evidenced by field observations, are secured at the weirs along the Cape.

The remaining twenty per cent of the food was made up of miscellaneous animals; no vegetable material was found in the regurgitations and stomach contents of the birds examined at Sandy Neck. The remains of animals in the food which could be identified comprised marine annelids, chiefly *Nereis virens*, crustaceans represented by numerous shrimp, sand-hoppers and a few small crabs; insects, chiefly beetles, flies and dragon-fly nymphs, all present in negligible quantities. Of the mollusca, only the squids were present in appreciable numbers and these were probably dead and floating on the water when picked up by the Herons. In Maine numerous shells of clams and other bivalve mollusks were found on the ground beneath the nests of the rookeries, but this may have been the work of Crows, and as yet I have no direct evidence of these birds feeding upon shell covered mollusks in nature. Apparently the Herons have not learned the trick of the Gulls that mount high in the air to let a clam fall on the rocks to be crushed in order to secure the prized contents. The only fresh water animals found in the food of the Herons at Sandy Neck were the tadpoles and adults of Fowler's toad which were abundant in the numerous pools in and around the heronry. Frogs and salamanders constituted the chief article of food of the Herons at a rookery near Atwood, Illinois. Dr. Alexander Wetmore,<sup>1</sup> states that waterdogs (*Ambystoma*) and frogs were the only food of birds breeding at Lake Burford, New Mexico. The birds acted as scavengers in that they ate the dead Axolotls (sexually mature larvae of *Ambystoma*) which were found floating on the water.

Dr. Frank M. Chapman<sup>2</sup> saw eels in various stages of digestion and decay in regurgitated masses which he found on the ground in a rookery near New York City. Dr. Paul Bartsch<sup>3</sup> states that the yellow perch comprises the largest part of the Heron's food in the colonies he has studied in the District of Columbia. He also noted eels, a garter snake, and frogs, but found no crayfish in the

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<sup>1</sup> Wetmore, A., 1920, Auk, vol. 37, p. 394.

<sup>2</sup> Chapman, F. M., 1900, Bird Studies with a Camera, p. 80.

<sup>3</sup> Bartsch, P., 1903, Smithsonian Misc. Coll., vol. 45, p. 107.

regurgitations. Mr. T. Jasper<sup>1</sup> states that the Night Herons eat fish, shrimp, tadpoles, frogs and leaches and Mr. Giraud also found mice and lizards in the food of the birds he studied on Long Island. Mr. O. E. Baynard,<sup>2</sup> who made a study of the food eaten by fifty young Black-crowned Night Herons in a Florida rookery, found the following: 60 crayfish, 610 small catfish, 31 small pickerel, and 79 dragonflies. Mr. Baynard emphasizes the importance of the crayfish eaten, as the latter destroy thousands of spawn of fish. He states that although many fish are eaten by the Herons, the fish are more abundant because of the protection afforded to their spawn by the destruction of crayfish. The fish are valuable to man not only as an article of food, but they serve as a material check on the mosquito population in that region of Florida. Reports from Jamaica show that the food of the Herons there is chiefly crabs and other crustacea. Mr. S. F. Denton<sup>3</sup> reports a very interesting and unusual experience in which a partly fledged young swallowed a downy nestling which had been placed in the same cage. He also writes that good sized snakes were swallowed repeatedly until the snakes were overcome and killed in the process. At another time, an attacking rooster's head was seized by the Heron in a desperate but futile attempt to secure food. As the bird grew older the animals were regularly killed before any attempt was made to swallow them. Mr. James DeKay<sup>4</sup> includes among other things in his list of articles of food eaten by this Heron an alga, sea lettuce (*Ulva latissima*). Vegetable food is seldom eaten, but Mr. Roy Latham<sup>5</sup> found that the young in a colony at Orient, Long Island, were fed upon an alga (*Agardhiella gracilaria*) and similar forms which abound in the water near Orient. Though the Black-crowned Night Heron may sometimes feed upon plants as cited above, it is pre-eminently carnivorous, depending primarily on aquatic animals of various kinds as a source for its food.

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<sup>1</sup> Jasper, T., 1878, Birds of North America.

<sup>2</sup> Baynard, O. E., 1912, Wilson Bulletin, vol. 24, p. 169.

<sup>3</sup> Denton, S. F., 1885, Random Notes on Natural Hist., vol. 2, pp. 9-10.

<sup>4</sup> DeKay, J., 1844, Zoology of New York.

<sup>5</sup> Latham, R., 1914, Bird Lore, vol. 16, p. 112.

## FOOD OF THE YOUNG.

The first food received by the downy young consists of juices of predigested material. In the examinations made at Sandy Neck, this food was so completely liquified that it was practically impossible to determine the kind of animals composing it. In delivering food to the downy young the adult seemed to insert the tip of her beak into the wide open mouth and the transference of the juices was made with comparatively little effort. The parent bird usually delivers small amounts at rather short intervals and I have frequently seen, from my blind, the downy heads of day old birds appear between the feathers of the parent to receive their ration of fish extract. By the third day, more substantial food, such as semi-digested fish and shrimp, were given to the young. Among 20 regurgitations of nestlings 3 to 10 days old, 16 were made up entirely or largely of shrimps present in pieces ranging from a few millimeters to one and in some instances three centimeters in length. These crustaceans are very abundant in the marshes of Barnstable Bay where the Herons may be seen fishing for them at all times of the day. Since a large percentage of shrimp was found in many regurgitations of the young until they were at least three weeks old, it is apparent that they constitute a very important element of the food at least of the younger birds at Sandy Neck. When the young became more than three weeks old the food was made up chiefly of fish, which were often delivered without any pre-digestion. In addition to the food brought by the adults, the young birds, when hungry, frequently sampled miscellaneous materials about the nest as shown in the following determination of a regurgitation from a bird 25 days old. Fish comprised 90 per cent, fragments of bark 3 per cent, pine needles and buds 4 per cent, grass from the nest 1 per cent, flies and beetles 0.5 per cent and miscellaneous unidentified material 1.5 per cent. From my blind I saw this bird greatly annoyed by a large blowfly which had been attracted by the odors of the nest. The bird's eye followed the circles and evolutions of the buzzing insect and made at least a dozen futile attempts before he succeeded in hitting his mark. Needless to say such practice develops skill which will be of use on future fishing expeditions.



The slightest disturbance to the young birds and often the mere presence of a human being in the vicinity of the nest was enough to cause them to vomit the contents of their stomachs, a habit extremely useful when one desires to make food determinations. This reaction of the young is apparently a reflex initiated by the stimulus of fear. Birds which I visited, handled and measured daily exhibited no fear and in such a physiological state, never regurgitated. Preceding the act of vomiting the abdominal muscles underwent rapid and violent contractions. It does not seem to be a defensive action on the part of the bird though in some instances it may prove such. Certainly it is an offensive act to any one who is unfortunate enough to be the target. At one nest a young disgorged an enormous meal on the sticks at the edge of the nest; immediately a fellow nestling who evidently was not so well favored at the last visit of the parent, proceeded to eat up the unsightly mess with an apparent relish.

The method of feeding the young is described in my notes of July 4, 1920, as follows: "An adult bird has appeared at nest number 138 which contains four young four weeks old, the nestlings have suddenly arisen from their dozing posture to tease and coax for the dinner which is long overdue. All are uttering calls resembling "Yak!, Yak!, Yak!" One youngster has leaped up to secure a hold of the beak of the mother bird, the others have now joined him apparently aware that it is the doorway to a well filled cupboard. After thus testing the patience of her young for 3 or 4 minutes the mother finally raises her crown feathers, goes through a contortion of her neck and suddenly thrusts her beak toward one of the young. The mother is now going through a wriggling, writhing motion, swaying the head of the youngster back and forth as she proceeds to deliver a large fish. Two minutes later: The caudal fin of the fish is still protruding from the mouth of the favored bird who rests on the edge of the nest, content to wait until its stomach can make room for the entire fish. The parent bird is now perched on a branch some distance from the nest and gives no heed to the pleading and clamoring calls of her ever hungry offspring. Both adult birds have been away fishing for the other parent has just alighted at the nest with a small herring in its beak. One of the audacious young has snatched the

herring without waiting for any preliminary ceremony and has swallowed it in an instant. Two minutes later: The second parent to appear has regurgitated five medium sized fish on the nest beside the young which are scrambling after them but the one with the large fish in his stomach is not so enthusiastic. Three minutes later: The fish are gone and the young are calling for more. Five minutes later: The parents have left the rookery for the fishing grounds and the youngsters have settled down to doze until the next meal." I saw several broods of the older young fed in the manner last described but in the case of the younger nestlings the food was usually delivered directly from parent to offspring by the process of regurgitation.

In order to study the development and growth of the young after they were able to leave the nest, eight birds of various ages were kept in poultry coops at my camp where I could observe them conveniently. This method also provided an opportunity to learn something of their preferences for food. The young birds are easily adapted to cage conditions, and after one or two days, ate readily the food provided for them. Fish of various kinds were secured in abundance from Mr. Lovell's weir which stood less than a stone's throw from my camp. The confined birds ate freely of bread soaked in water or milk, but preferred fish when both were placed before them. Herring seemed to be preferred to whiting, but the latter were taken before sculpins, puffers, sea robins or flounders. All the latter were eaten when no other kinds were available. Living fish were much preferred to dead ones. Fish were more readily eaten than beef or pork, but all the birds selected shocked clams instead of fish when both were placed before them. The birds were also fond of snails but as I have previously stated, I have no conclusive evidence that shell mollusca are eaten by the Herons in nature. The birds I had in captivity ate from half a pound to a pound and a half of food daily, and I believe, those existing under natural conditions, where they would be more active, may often demand much more for their daily ration.

It is apparent that the colony of nine to ten thousand birds must exact an enormous toll on the fish of Cape Cod Bay. Since fish, according to my data, constitute 80 per cent of the food of the Herons it is conservative to estimate that 3 to 4 tons of fish

are eaten daily during the nesting season at Sandy Neck. To be sure some of the fish destroyed are worthless as food to man, but others like the herring, whiting and mackerel are of great value. Furthermore, it must not be overlooked that fish and other animals useless to man serve as food for fish of commercial importance. The fishermen of the Cape are well aware that the Herons exert an appreciable effect on the fish supply, but not in a single instance did I find any sentiment unfavorable to the Heron. When seals appear in large numbers in the harbor, it is a signal for violent denunciation on the part of the fishermen. Every effort is made to exterminate the furry intruders, but the Herons receive the protection of all, and not a word of protest is voiced against the avian poachers. The natives think of these birds as essential to their environment, beautiful creatures well worth the price of the fish eaten. If the agriculturists would follow the example of these fishermen of the Cape, they would not complain when the Robins eat a few of their strawberries and cherries.

#### CALLS AND NOTES.

One of the familiar and characteristic calls of the Black-crowned Night Heron is a sharply accented "Quawk," a note, which I have already stated, has given origin to one of its many common local names. At Sandy Neck, as I listened to the numerous Herons which passed over my camp during the night and to others perched on the fishing weir, I noted variations which may be crudely represented by 'Qua,' 'Quak,' 'Quark,' or 'Squawk.' It would be interesting to know whether these modifications signify different meanings to the fellow Herons or are merely individual variations of little or no linguistic consequence. Though the sharply accented calls described above are the usual ones heard, the repertoire of the Heron is by no means limited to these simple notes. The medley of voices heard when one is in the midst of a large colony of birds baffles the listener in his attempts to record and interpret the infinite number of sounds. Indeed, the complicated social community made up of hundreds and often thousands of birds, seems to demand a kind of language to serve as a means of inter-communication.

When one approaches the colony he invariably disturbs first

the outpost sentinels who seem ever ready to give a warning note which sounds like, 'Woc, woc, wock!-ä-woc, woc, woc.' This call usually results in a number of Herons rising from the neighboring tree tops, who take up the call and repeat it until a virtual cloud of birds is flying about in great confusion. After you have entered the rookery, the notes of the adults are drowned out by the incessant clatter of the young birds which during July and August are represented by birds of all ages. The call of the downy young resembles a faint 'Tet! tet! tet!' or 'Yip! yip! yip!' the half grown nestlings utter a sound more like 'Yak! yak! yak!' and the older young utter a harsher, coarser sound resembling roughly the words 'Chuck, chuck-a-chuck, chuck, chuck.' These various calls of the young all mingled together sound like the deafening clatter and hum of an infinite number of machines in a great factory and indeed it is a Heron factory. During the course of the day the intensity of the calls of the young varies directly as the keenness of their appetites. These calls could be heard at all hours of the day or night but just before the bulk of the adult birds came in from the feeding grounds, a time which varied with the tide, the number of young calling and the volume of sound was at a maximum. At such times the rookery resounded with a deafening monotonous clatter. When the young were hungry, they were also irritable, and the least disturbance by a neighbor would cause them to render a defensive thrust accompanied by a ghastly, sharply accented 'Sque-e-e-e-e-ak.' In uttering this squeal the beak is thrown wide open, during the 'Sque-e-e-e-e' and then suddenly snapped together at the termination of the much accented 'ak.' Doubtless it is these wierd sounds which have led some observers to compare the noises of a colony of Night Herons to the war whoops of a band of Indians. A similar note is uttered by the adults when they are defending their nests against intruders.

When the parent bird arrives with food she often utters a series of low guttural tones, some of which resemble very much the sounds made by an old hen when she is brooding her chicks. At other times, she would give a series of loud calls resembling 'Oc-oc-goc! -goc! -goc! -oc, -oc, oc! oc!' or 'Woc-a-woc, woc, woc, Wock-a-woc, woc,' which judging from the actions of the young, conveyed a definite unmistakable meaning.

## GENERAL ACTIVITIES OF THE HERONRY AT SANDY NECK.

There is more or less activity on the part of the birds at all hours of the day or night during the nesting season but the hours following dawn before it became hot and in the evening immediately preceding and following sunset were as far as could be determined, the times when the birds were most busily engaged in feeding their young. An observer standing on the summit of the high sand dune west of the rookery commanded a view that enabled him to see readily every bird which came to or went from the colony. Since these numbers give an index to the relative activity of the birds the following counts made July 10, are of considerable interest.

Time	Number of birds returning to the rookery	Number of birds leaving the rookery
3:45 A.M.-4:00 A.M.	3	0
4:00 A.M.-4:15 A.M.	18	20
4:45 A.M.-5:00 A.M.	30	174
6:30 A.M.-6:45 A.M.	170	135
7:00 A.M.-7:15 A.M.	40	30
2:30 P.M.-2:45 P.M.	6	8
3:00 P.M.-3:15 P.M.	2	115
6:30 P.M.-6:45 P.M.	185	43
7:00 P.M.-7:15 P.M.	180	21
7:30 P.M.-7:45 P.M.	62	40

The above counts are fairly typical but the state of the tides influenced to some extent the movements to and from the rookery. It was impossible to make accurate counts at night but though the task of feeding went on uninterrupted by darkness the activities were never as pronounced as at dawn and sunset. It is generally believed that the Night Heron as the name implies feeds chiefly at night. This conception has doubtless been formed in part from seeing the birds, as in my own experience, venture near the habitation of man only at night. A fish weir which stood less than 100 yards from my camp was seldom visited by a Heron in day time yet at every low tide during the night one could expect to see a dozen or more Herons standing on the poles and as many others clinging to the net near the water engaged in capturing fish entangled in the meshes. I have also heard, even on the darkest nights, the calls of these birds as they flew overhead, but certainly

the Black-crowned Night Heron is not to be classed with such birds as the Owl which have exclusive nocturnal habits.

The following notes taken from my field book for June 27 will give the reader an idea of the general activity of the colony at night.

"6:00 P.M. I have concealed myself on the side of one of the dunes west of the rookery, a place where I have a chance to observe the birds in the ever changing light of the sunset.

"6:15 P.M. As the heat of the sun becomes less intense the older of the young birds which have been under cover of the pine boughs are coming up into plain view. I can see hundreds of young as I survey the tops of the trees with my binoculars.

"6:30 P.M. A parent bird has just arrived to feed four young which are in a tree about 20 yards from me. The food is not delivered immediately so the impatient young are making known their feelings about the delay by thrusting their beaks towards the parent and uttering the characteristic calls.

"6:38 P.M. A fish having the appearance of a herring and weighing about three fourths of a pound was regurgitated by the adult before she thrust her beak in the usual way toward one of the young. Two of the fledgelings seized the fish at the same time and a royal tussle is on in the tree tops. Neither is willing to compromise and the fish fails to part.

"6:42 P.M. One of the birds has lost his balance and in order to secure himself has released his claim on the herring to grasp a limb with his beak. The successful bird is swallowing the fish with a gleam of triumph in his eye, while the old one is viewing the scene with apparent approval. There are many birds coming to and leaving the rookery and it seems to be the most active period of the day. The sight of these beautiful Herons illuminated by the mellow glow and brilliant hues of a most gorgeous sunset is one to be long remembered. The birds are in every conceivable attitude—some are proudly displaying their plumes or preening their feathers, some are perched in motionless attitudes appearing like mounted specimens and others are brooding eggs or young. The most interesting of all however are the antics and activities of the hundreds of families of older young.

"7:15 P.M. As the sun lowers and the heat is becoming less intense practically all of the young which are able are leaving the

ests to climb to the branches above and those which have been out climb still higher until they reach the topmost twigs. Often there is a dispute for the summit of the tree but the oldest and strongest usually win and hold the coveted places. On the tops of the cedars, forming a dense grove, near the rookery are hundreds of Herons which have been congregating during the past half hour. Many of these birds are in the streaked or second year plumage, a type which does not seem to be present at the rookery in large numbers during the day time.

"7:30 P.M. The sun has sunk down behind the sand dunes, the interior of the rookery is becoming dark and objects there can no longer be easily distinguished but the tops of the trees are still illuminated by a dim roseate glow of the sunset.

"7:40 P.M. No sooner has the twilight faded when a glorious moon throws a soft mellow light over the whole scene. which enables me to see clearly the birds on the tree tops especially the light colored adults.

"8:00 P.M. The young are leaving their perches on the limbs to huddle together in the nests as the temperature of the night air suddenly drops. Some of the more hesitating youngsters are receiving vigorous scoldings from their parents because of their unwillingness to go below. The older young which have a substantial covering of feathers seem to be given greater indulgence, and are allowed to remain.

"8:30 P.M. Silence and night are not to be associated at a Night Heron colony. The screams and calls seemed to be increased in volume when contrasted with the quietness of the surroundings.

"9:00 P.M. I left the blind on the sand dune to explore the interior of the rookery. It was indeed a weird experience to be in the woods alone where every form is made grotesque by the uncertain light, and every sound of that multitude of birds, seems to be magnified ten-fold. I could scarcely see my way in certain sections of the denser portions of the pines, yet the birds, judging from their movements, evidently distinguished me as easily as they do in the bright light of day.

"10:10 P.M. I was seated on a fallen tree trunk, listening to the deafening calls and shrieks of the night when a four-footed animal

appeared in a spot of moonlight not more than thirty feet from me. I called to him thinking it was a dog which had lost its way. As soon as he heard my voice he directed his ears toward me, gazed for a moment and then wheeled around and leaped into the underbrush. The general behavior of the animal and the large bushy tail lead me to believe it was a fox on one of his nightly patrols in search of food." (I was told subsequently that foxes are common among the dunes of Sandy Neck and no doubt a large part of the living of these beasts during the summer months, consists of unfortunate young herons which frequently fall from the crudely built nests).

"11:00 P.M. I am leaving the rookery to return to my camp. I can hear the calls of the adult birds flying back and forth above me from their fishing grounds to the rookery. When I reached the brink of the sea wall, I crouched in the tall sea grass to watch about twenty Herons which were fishing along the edge of the water. The Herons, while thus stalking their prey appeared like stone images of the birds, but at irregular intervals, a splash, a gulp, or a squawk revealed that these fishers were alert and far from 'asleep on the job.'"

(*To be concluded.*)

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## NOTES ON THE SHORT-EARED OWL.

BY CHAS. A. URNER.

ON or about May 22, 1922, the nest of a Short-eared Owl (*Asio flammeus*) containing six eggs was found by a farmer's boy on a stretch of open salt hay marsh near Elizabeth, N. J. So closely did the bird sit that it was accidentally struck by the scythe and its legs injured. One egg, nearly ready to hatch, was broken. The remaining eggs were left undisturbed but they had disappeared the next morning, though the two adults were frequently seen in the vicinity.

Two adult birds, probably the same pair, I saw flying about not