

A WINTER CROW ROOST.¹

BY CHARLES W. TOWNSEND, M.D.

PRIOR to the winter of 1916-17 most of the Crows of the eastern parts of Essex County, Massachusetts, spent the nights in roosts in the pine thickets at Annisquam and West Gloucester. Hither from all directions in winter afternoons these birds could be seen wending their way. The general course of flight over the Ipswich dunes was from north to south. There were, however, several small roosts in the Ipswich region. One was in a grove of white pines and cedars on the south side of Heartbreak Hill; another, which lodged about five hundred birds, was in one of the pitch pine thickets of the Ipswich dunes. In November, 1916, I discovered that the ground under and near the large thickets of evergreens and hard woods on the southerly side of Castle Hill close to Ipswich beach was covered thickly with Crow pellets and droppings. I was not surprised, therefore, to find that the afternoon flight of Crows was directed towards these thickets, and that the birds were passing over the dunes in an opposite direction to that taken in former years. Whether the great roosts at Annisquam and West Gloucester have been deserted or not I cannot say, but it is evident that the larger number of birds have transferred their winter nights' lodgings to Castle Hill.

Twenty-five years ago the whole southerly side of Castle and High Hills was pasture and mowing land. The owner at that time began planting trees on a large scale. At first only visible in the grass these have grown to a height of thirty or forty feet, and there is now a respectable forest over twenty or thirty acres of land. The evergreen trees are largely European species — Scotch and Austrian pines with spruces and firs. There is a large grove of European larches, and there are patches of willows, maples, ashes, buttonwoods and other deciduous trees.

In the short winter afternoons the Crows begin their flight to the roost long before sunset. By three o'clock or even as early as one o'clock, especially in dark weather and in the short December days, this bed-time journey begins, while in the latter part of

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February the flight is postponed until half past four or a quarter of five. From every direction but the seaward side the Crows direct their course towards the roost. Three main streams of flight can be distinguished: one from the north, from the region of the Ipswich and Rowley "hundreds,"—the great stretches of salt marsh that extend to the Merrimac River,—a second from the west and a third,—apparently the largest of all, broad and deep and highly concentrated,—from the south.

It was the last of these rivers that on a cold December afternoon with a biting wind from the northwest I first studied in company with Mr. Francis H. Allen. It was an impressive sight. About 3 o'clock the Crows began to appear, singly and in small groups, beating their way in the teeth of the wind towards the north. In flying over the estuary of the Castle Neck River they kept close to the water as if to take advantage of the lee behind the waves; over the land they clung to the contour of the dunes. As we walked among these waves of sand the Crows often appeared suddenly and unexpectedly over the crest of a dune within a few feet of us. Silently for the most part, except for the silken rustle of their wings, they flew over in increasing numbers until it was evident that they were to be counted, not by hundreds, but by thousands. Many of them alighted on the dunes to the south of the roosting place; sand, bushes and stunted bare trees were alike black with them. Others assembled on the bare hillside to the east. About sunset a great tumult of corvine voices issued from the multitude,—a loud cawing with occasional wailing notes,—and a black cloud rose into the air and settled in the branches of the bare trees to the west of the roost. From here as it was growing dusk they glided into the evergreens for the night.

The last day of the year 1916, I spent with Dr. W. M. Tyler in the dunes. The wind was fresh from the northwest,—the temperature was 15° Far. at 6.30 A. M., 18° at noon and 20° at 6 P. M. As early as one o'clock in the afternoon a few Crows were seen struggling north over and close to the surface of the dunes. Others were noticed flying high and towards the south. This southerly flight came from over Castle Hill to the north, passed the roost and continued on over the dunes. At half-past three some of these birds, which were apparently turning their backs on their usual

night's lodging place, met with a large company coming from the south and all settled together in the dunes about two miles south of the roost. Some of the birds coming from the north, however, settled on the bare fields by the roost, and their numbers here were augmented by a stream from the west. This concourse on the hillside set up a great tumult of cawings just before four o'clock. At five minutes after four the united multitude of northerners and southerners rose from their meeting place in the dunes and flew low to join their noisy brethren on the hillside. This river of black wings from the south was a continuous one and it was joined just before its debouch on the hillside by the stream from the west. The river from the north had split into two layers: the lower flying birds came to rest on the hill,—the higher flying ones favored by the strong northwest wind, continued on their way south, notwithstanding the great current that was sweeping north below them. They joined their comrades in the dunes and retraced their steps. No signs of starvation and impaired vigor in these unnecessary flights, or in the games of tag in which two or more of the birds would at times indulge!

The pace is now fast and furious. The birds are anxious to get within touch of the roost before it is dark but none have yet entered it. At 4.15 P. M., 135 birds pass in a minute from the south alone on their way to join the concourse on the hillside. A little later this southern river becomes so choked with birds that it is impossible to count them. From our point of vantage in a spruce thicket on the hill we can see that this flock stretches for two miles into the dunes and it takes four minutes to pass. The speed of flight, therefore, must be roughly about thirty miles an hour. At 4.15 P. M. the sun sets, but in the yellow glow of the cloudless sky the birds can be seen pouring by from the west and south. The bulk of the stream from the north now comes to rest on the hillside for only occasionally can a crow be seen flying to the south over the heads of the southern stream.

At 4.35 P. M. Dr. Tyler and I again counted the southern stream for a minute as they flew silently between us and the lighthouse. One of us counted 160 the other 157 birds, so it is probable that our counts were fairly accurate. This constant watching of the black stream from the south against the white light-house pro-

duced in both of us a curious optical illusion. The light-house and dunes seemed to be moving smoothly and swiftly from north to south!

At 4.37 P. M. a great cawing arose from the hillside and a black cloud of birds rose up, some to enter the roost, others to subside on the hillside. It was evident that the birds from time to time had been diving into the roost. At 4.40 P. M. it was rapidly growing dark and the tributary streams were evidently dwindling. Only 50 went by the light-house in a minute. Five minutes later it was nearly dark and only a few belated stragglers were hurrying to the concourse on the hill.

At 4.45 P. M. Dr. Tyler and I walked around to the north of roost and although we could see nothing in the darkness we could hear the silken rustle of wings and feathers as the Crows were composing themselves for the night's rest among the branches of the trees. The babble of low conversational notes that went up from the company suggested the sounds of a Night Heronry although *cawings* and *carrings* were interspersed with the *kis* and *uks* and *ahhs*. The odor was that of a hen-yard. The temperature in the grove, with its hundreds of corvine furnaces breathing out air heated to 105° or thereabouts, was probably distinctly higher than in the open. We refrained from entering the thicket, for any attempt to do so aroused the birds to flight.

In the dim light we could make out that the hillside field between the roost and the sea was still blackened with birds that were continually rising up and entering the trees. Some of them perched temporarily on the bare tops of the hard woods where they were visible against the sky. The noise and confusion were great. It would seem as if the roost was so crowded that the birds had to wait their time for a chance to get in and that a constant shifting of places and crowding was necessary before the Crows could settle in peace for the night. Hence the prolonged and varied conversation; hence the profanity.

It was an intensely interesting experience, this observation of the return of the Crows to their night's lodgings, and one wished, for eyes all about the head, well sharpened wits to interpret and a trained assistant to take down notes. How many birds spent the night in the roost? That is a difficult question to answer, but a

rough estimate can be made. There were three streams entering the roost beginning at one o'clock and continuing until a quarter of five. The largest of these was from the south, the next largest from the west and the smallest from the north. The greatest flight occurred in the hour before dark. From counts made in the stream from the south this flow averaged at least a hundred in a minute or 6,000 in the hour. If we suppose that an equal number arrived in the combined western and northern streams there would be 12,000 occupants in the roost, a very moderate estimate, I believe.

Crows were not the only species that sought refuge for the night in these evergreens. At half-past four a Starling was seen flying thither. But the great flight of Starlings appeared shortly after four. There were about two hundred of them — a mere nothing compared with the enormous multitudes that are soon destined to inhabit these regions, for the European Starling, introduced in some evil moment to these new lands of the western Hemisphere, is increasing by leaps and bounds. This flock of two hundred Starlings flew by with a whistling of wings straight for the roost, but on its arrival at once began a series of aerial evolutions which lasted for half an hour by the watch, before the flock finally entered the roost for the night. At times the birds would spread out like a mist on the hillsides at times they would combine to form a compact dark ball; again they would stream off like a whisp of smoke, and turn and twist and snap the whip in a most amazing manner. The exhibition of this troop of Starlings was that of well trained performers executing difficult and intricate evolutions without hesitation and without fault. The rhythm and harmony of all their movements was perfect; the speed of action was so great that it was at times difficult to follow them with the eye. They opened or closed their ranks, they deployed to the right or to the left, they descended or ascended as if impelled by a common mind or as if possessed of perfect telepathic intercommunication. One could hear no word of command and there appeared to be no leader. The spirit of play was in it all and the joy of untiring energy, of perfect mastery of the air and of consummate grace and skill. It was a marvelous and mysterious exhibition.

I have often watched from my house the western stream of

Crows go by bound for the roost. With a strong northwest wind the greater number fly in the lea of the hill close to the marsh. A smaller number push their way in the valley to the north partly sheltered from the wind by the trees. It is rare that one exposes himself to the full sweep of the wind over the top of the hill. When the wind is in the east the Crows fly close to the marsh and follow the windings of Castle Creek. With a westerly breeze, however, the birds fly high and, silhouetted against the sunset glow, the birds pass over the hill at great speed, alternately flapping and sailing. Those that fly over the marshes keep at the level of the top of the hill instead of skimming close to the ground as they do in unfavorable winds. I have counted eighty and at times as many as one hundred and twenty passing in a minute in this western tributary to the roost.

The afternoon of the twenty-second of February, 1917, was cold and clear with a wind from the northwest. I made my way to the top of Castle Hill in order to watch the stream of Crows from the north. The first arrivals came at half past four o'clock. They were flying over the ice-filled marshes of the Ipswich and Plum Island Rivers, on the lookout perhaps for a last scanty portion of food before bedtime. On reaching Castle Hill they flew up over its crest and glided down into the hard woods to the east and west of the evergreen roost. Here they took part in the regular noisy evening crow reception of the three streams before retiring for the night.

At the full of the moon on the sixth of January I visited the roost at 9 P. M., a time when all well regulated crows should, I had supposed, be sound asleep. As I approached the roost much to my surprise I heard distant sleepy cries like those of young herons, and when I reached the edge of the roosting trees there was a tumultuous rush and bustle of Crows flying from tree to tree and overhead. Strain my eyes as I would only occasionally could I catch sight of a black form, although the air was brilliant with the moonlight and the reflection from the snow. I turned back at once as I had no desire to disturb the birds' slumbers but it was evident that many, even at this late hour, had not settled down for the night.

The morning flight from the roost takes less time than the evening return. As I approached it in the semi-darkness at 6.25 A. M. on

January 7, a distant cawing could be heard and a minute later nine Crows were seen flying off to the south, and three minutes later, nine went off to the west. At half past six, after a great uproar of *caws* and *uks*, occasional rattles and wailing *ahhhs*, a broad stream boiled up from the roosting trees and spread off towards the west, obscurely seen in the dim light except when the birds stood out against the beginning red glow in the east or against the light of the setting moon in the west. As I stood concealed on the hillside among a grove of spruces, the Crows passed over my head, noiselessly except for the silken swish of their wings, fully a thousand strong. Then no more for over five minutes although the tumult in the roost continued in increasing volume. At 6.40 the roost boiled over again, but the birds spreading in all directions soon united into a black river that flowed over the dunes to the south. The settings for this black stream were the white sand dunes and the luminous glow in the east which had become a brilliant crimson fading to orange and yellow and cut by a broad band of pink haze that streamed up to the zenith. The morning star glowed brightly until almost broad daylight. The sun rose at 7.14. At 7 I entered the roost and hurried away the few hundred remaining birds some of whom were in the bare tops of the hardwoods ready to depart, while others were still dozing in the evergreens below. The air was close and smelt like a hen house. Pellets and droppings were everywhere.

On the last day of 1916, Dr. Tyler and I watched the crows leaving the roost. We arrived at 6.40, too late to see the first departures. From time to time we counted the birds going by in the stream to the south and as our counts showed a remarkable agreement they may be taken as substantially accurate. At 6.45, 105 passed in a minute; at 6.50, 125 passed at 6.55, 58 passed, at 6.58, 121 passed and at 7.00, 63 passed.

The Starlings left the roost at 7 o'clock and passed us with a chorus of shrill cries or perhaps it was the swish of their wings that we heard. They were intent on the day's hunt for food and did not waste time on setting-up evolutions. At 7.13 the sun rose and the roost was silent and deserted.

In the early part of the winter there is plenty of food for the Crows. The bayberry and staghorn sumac bushes, the poison ivy, cat briers and red cedars are laden with their fruit. The salt

marshes and beaches furnish a bountiful supply of food in the form of molluscs and crustaceans as well as in dead fish and other carrion brought up by the tides. In fact it is these marshes and beaches that make such a great concourse of crows possible; — the inland country is able to support but a mere fraction of such a multitude. If the winter is a prolonged and severe one, the food problem becomes more and more difficult. All the bayberry bushes that are not covered with snow are stripped of their berries; the red flames of the sumac are battered and reduced to a spindling central stalk with but a few red furry seeds remaining. The upper beach, the source of so much food supply in dead fish, crabs and molluscs, is encased in ice and built up into a wall; the marshes with their wealth of small snails and mussels is sealed several feet deep in tumbled cakes of ice, and the tide rises and falls in the creeks and larger estuaries under an unbroken icy mantle. All the uplands are buried in snow. It is difficult to conceive how this multitude of red-blooded active birds can glean enough food under these conditions. The number of food calories needed by each Crow must be large. But the Crow like the Indian and all creatures of nature is well able to take care of himself and to utilize every possible source of food supply. Neither a feast nor a famine disturbs his equanimity unless the latter is too prolonged.

Although most of the birds appeared to be endowed with plenty of strength and energy, one at least on February 22 seemed to be suffering from the hard times. This Crow alighted in a feeble tottering manner on a post within forty yards of me, and balanced himself with difficulty. I walked to within thirty yards of him when he wearily took wing only to alight in a similar way on another post a couple of hundred yards away. When flushed from this he managed to fly a few rods to the roosting grove.

Two other Crows previous to this incident were found dead near the roost. Both were normal in size as shown by measurements,¹ and neither showed any signs of injury. One was very thin. The case of the other is worth recording in detail. It was on

¹ In 'The Birds of Essex County,' p. 243, I recorded the examination of a Crow found dead early in March, 1904. "The body was greatly emaciated, the intestines nearly empty, and the stomach contained only a husk of oats and a piece of coal ashes. There was no evidence of disease. The bird weighed only ten ounces and was small in every way, — a case of the small and unfit perishing."

January first, 1917, that I discovered a Crow in the topmost branch of a slender fifty-foot ash tree on the edge of the roost. A string had in some way become entangled about one foot and the branch of the tree. Struggle as he would he could not free himself and although he could perch at ease on the branch, he often hung head downwards from it exhausted by his fruitless efforts. While I watched him and searched my brain for some means for his release, another Crow repeatedly swooped down and passed within a few feet or even inches of the poor captive. Both birds were cawing violently. As it was impossible to climb the slender tree I decided to go on to the beach, hoping that in my absence fortune would favor the bird, and that the string might become untangled. On my return an hour later the victim was still tied fast while on the ground a few yards from the foot of the tree and directly in my path was the body of a Crow still warm. No other Crow was in the neighborhood. The dead Crow was a male of normal size as shown by measurements, its plumage was in good condition and it showed every evidence of perfect health. No injury could be found anywhere — there was no sign of hemorrhage under the skin in the abdominal cavity or in the skull. Fat was present in considerable amount, especially about the viscera.

In order to finish the story it may be recorded here that by the forcible bending down of the top of the slender ash so that the captive Crow could be reached from another tree this unfortunate bird (of its sex I am ignorant) was released only to die on the following day. I shall not attempt to answer the question as to the cause of the death of the Crow whose autopsy I have related, but one is tempted to say that he died of grief for the captive one.

During the greater part of the day the roost is deserted, but there is much to be learned of the ways of the Crow even under these conditions. Pellets and droppings are everywhere on the ground under the trees as well as in the surrounding fields and they are especially obvious when the ground is covered with snow. The fact that the snow in the fields near the roost is well trodden by the Crows and spotted with droppings and pellets might lead one to think that the birds had spent the night there, but these studies have shown that the field was merely a reception room where the birds met before retiring for the night.

The pellets which are ejected from the mouths of the birds after a meal and are composed of the useless and indigestible portions of the meal, are cylindrical in shape, rounded at the ends and measure one to two inches in length and about half an inch or more in diameter. In warm or wet weather they speedily break up and mingle with the soil, but in cold weather they freeze and retain their form. A study of these pellets reveals the nature of the corvine dietary. In times of plenty, as in the early fall when berries are everywhere, the Crows are extravagant and wasteful in their feeding habits. Much nourishment is thrown out in these pellets before it has had time to be digested in the stomach. Like the ancient Romans they empty their stomachs that they may feast the more. Crows take no interest in food conservation; the pellets at these times show much wasted food. Not so in severe winters when famine is close at hand. Then every bit of the waxy coat of myrtle berries is digested off and there are no intact cranberries, as in the bounteous autumn, but only the remnants of skin and seeds. At these times also some ashes are to be found in their pellets, as if the birds were trying to quiet the stomach craving by bulk, and hunger had made them bold in visiting the refuse piles near houses.

I collected at various times, from November to February, several hundred of these pellets, amounting in bulk to 662 cubic centimeters of material after the pellets were broken up into their composite parts. This I sent on to the Biological Survey at Washington and received from Mr. Nelson, Chief of the Survey, the following report:

"The examination of crow roost material sent in by you has been completed by Mr. Kalmbach. It proved to be a most interesting lot of pellets containing many more specifically different items than are to be found in similar material from roosts in this vicinity. I am appending herewith the result of this examination. The numbers connected with the more abundant seeds are approximate, as they were secured by carefully counting the seeds in a portion of the material and then multiplying to get the total.

Insects.

- 1 *Sphæroderus lecontei* (Ground beetle)
Trace of another carabid
Traces of two other unknown beetles
- 3 *Hypera punctata* (clover-leaf weevil)

- 1 *Sphenophorus* sp. (bill-bug)
- 1 *Rhodobænus tridecimpunctatus* (bill-bug)
- 1 *Sitona hispidula* (clover-root curculio)
- 17 acridids (shorthorned grasshoppers)
- 2 *Gryllus* (crickets)
- 1 hymenopteron
- Trace of a fly
- 2 jaws of caterpillar
- 3 small Tineid cocoons

Other invertebrates.

- Spider fragments and cocoon
- Jaws of 3 *Nereis* sp. (marine worm)
- 100 *Melampus* sp.
- A few fragments and about 750 operculi of *Littorina* sp.?
- Mytilus* sp.
- Other mollusk fragments
- Parts of a crab

Vertebrates.

- Bones of fish
- Bones and scales of snake
- Shell of hen's egg
- 4 *Microtus pennsylvanicus* (Meadow mouse)
- 1 *Condylura cristata* (Star-nosed mole)
- 2 *Blarina brevicauda* (Short-tailed shrew)
- Several larger bone fragments (carrion)

Plants.

- 10,000 seeds of *Myrica carolinensis* (Bayberry)
- 1,200 " " *Rhus radicans* and *R. vernix* (Poison Ivy and Poison Sumac)
- 1,100 " " *typhina* and *glabra* (Staghorn and Smooth Sumac)
- 80 " " *Berberis* sp. (Barberry)
- 360 " " *Oxycoccus* sp. (Cranberry)
- 30 " " *Juniperus* sp. (Red Cedar and Low Juniper)
- 50 " " *Smilax* sp. (Cat-brier)
- 100 " " *Ilex verticillata* (Winter berry)
- 2 " " *Vitis* sp. (Grape)
- 2 " " *Solanum* sp. (Night shade)
- A few kernels of oats and hulls
- A few kernels of wheat and hulls
- A few kernels of barley and hulls
- A few kernels of corn (fragmentary) and hulls
- Trace of buckwheat
- Fragments of seeds of pumpkin or squash

Seed and skin of apple
Pulp of pear (?)
Acorn
Meat of an unknown nut
A piece of rotten wood
A piece of cork

Miscellaneous.

A rubber band
Gravel

THE PTERYLOSIS OF THE WILD PIGEON.

HUBERT LYMAN CLARK.

RECENTLY, Dr. Jonathan Dwight called my attention to the desirability of placing on record an account of the pterylosis of the Wild Pigeon (*Ectopistes migratorius*), since material suitable for the purpose is accessible to me. For the use of this material, I take pleasure in acknowledging my debt to Mr. Henshaw and Mr. Bangs, of the Museum of Comparative Zoölogy.

The Museum is so fortunate as to have the skin of a very young nestling (M. C. Z. no. 73216) from Wisconsin, which although covered with its nearly uniform coat of neossoptiles yet shows fairly well the main tracts of the pterylosis. This nestling measures about 90 mm. in length, with the bill about 15 mm. more. The skin is light brown, the neossoptiles are rather bright tawny yellow and the feather-buds of the coming contour feathers are nearly black. The wings and little stump of a tail are too badly dried up to make any study of the quills profitable, but perhaps the most striking feature of the pterylosis is the marked development of the "pelvic wing" so well described and figured by Beebe in the White-winged Dove (1915, *Zoologica*, vol. II, no. 2). In the young *Ectopistes* this consists of nineteen quills as against eighteen in *Melopelia*, but owing to the position of the tibia and the dryness of the skin, it is not possible to determine satisfactorily whether the arrangement of these quills is in reality as different from that



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