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WINTER ROOSTING COLONIES OF CROWS.

C. L. EDWARDS.

Crows constitute one of the most sagacious, gregarious, and omnivorous genera of birds. Throughout their wide distribution they form colonies which may be either small and of the family nature, where the crows do not migrate but live together throughout the year, or of large aggregations, composed mainly of migrants collecting together for the winter. In this country their winter colonies are found at or about 40° N. latitude along the Atlantic coast and in the valley of the Mississippi. They are so populous and so well organized, and their roosts so permanent, that they afford one of the best fields for the psychologist to study the manifestations of the social instinct. Although various phases of their gregarious habit have been recorded by a number of observers, there has hitherto been no systematic attempt to present the topic as a whole, including study of individual colonies, the number of colonies, with a general conspectus of the American literature and legislation upon the subject, such as is attempted in this preliminary report, to be followed by more detailed study of special phases later.

The importance of the topic for all interested in what, since Palmén and Beard, might almost be called the philosophy of bird migration, or in the study of those

remarkable social organizations our knowledge of which has been so well compiled by Espinas and which has been so suggestive to so many writers, or in the social organizations of mankind, is obvious.

Although throughout New England and New York crows are found as winter residents, and roosting colonies of several hundred individuals have been reported, yet the large majority of crows migrate southward to spend the winter. Audubon⁽⁵⁾ says they "become gregarious immediately after the breeding season," forming large flocks which towards autumn remove to the Southern States. Dr. C. Hart Merriam tells me that in New York, soon after the nesting season, as early as July and August, the crows collect in flocks which gradually increase in size until numbering several hundred individuals. In October these flocks migrate, and with the crows indigenous to our more southern territory, form the winter colonies.

These colonies have been reported from Delaware, New Jersey, Virginia, Pennsylvania, and Maryland, in the East, and from near St. Louis, Missouri, Kansas, and Nebraska, in the West. Mr. Rhodes⁽⁶⁾ gives a list of fourteen roosts: eight in New Jersey, two of which are now in use, the others having been deserted from two to forty-five years; four in the Delaware River, one of which, Reedy Island, is now in use, the others deserted from twenty to seventy years; and two in Pennsylvania, one of which is in use, the other deserted eight years.

The literature of crow roosts is not very extensive. The most historic is the Pea-patch, described by Wilson,⁽¹⁾ "near Newcastle, on an island in the Delaware . . . a low, flat alluvial spot of a few acres, elevated but little above high water mark and covered with a

thick growth of reeds. . . . It is entirely destitute of trees, the crows alighting and nestling among the reeds, which by these means are broken down and matted together." The colony was once destroyed during "a sudden and violent northeast storm" by the tide flooding the island. Wilson continues : "This disaster, however, seems long to have been repaired, for they now congregate on the Pea-patch in as immense multitudes as ever."

According to S. W. Rhodes⁽⁶⁾ this historic roost, the condition of which Nuttall in 1829 did not know, "was abandoned soon after the construction of Ft. Delaware was begun in 1814, and . . . the crows betook themselves to Reedy Island as the most convenient substitute." Nuttall⁽²⁾ first tells us of the colony at Reedy Island. Mr. George W. Jones, keeper of Reedy Island lighthouse, in a report kindly sent me by Dr. C. Hart Merriam, says : "The island, one mile from the mainland, opposite Port Penn, Del., is two miles long and contains about sixty-five acres of marsh land. There are no trees or bushes, but the reed grass grows very thickly upon the island. The crows occupy about twenty acres, breaking down the reeds, which are from seven to nine feet tall, and roosting upon the broken stems."

Dr. John D. Godman⁽⁴⁾ has left some valuable observations upon the crow, and as he lived for a time in Anne Arundel County, Md., only three or four miles from the Arbutus roost (described later), it was no doubt the ancestors of these crows that he observed. "The roost is most commonly the densest pine thicket that can be found, generally at no great distance from some river, bay, or other sheet of water which is last to freeze or rarely is altogether frozen. To such a

roost the crows, which are during the daytime scattered over, perhaps, more than a hundred miles of circumference, wing their way every afternoon and arrive shortly after sunset." Mr. S. W. Rhodes⁽⁶⁾ gives personal observations of a colony near Merchantville, Camden Co., N. J., which occupies oak trees twenty feet high, covering fifteen or twenty acres of ground.

Dr. Coues⁽⁷⁾ says: "In settled parts of the country the crow tends to colonize, and some of its 'roosts' are of vast extent. Mine is on the Virginia side of the Potomac, near Washington." Concerning this roost a newspaper writer, "Invisible,"⁽¹¹⁾ tells us, among many highly colored items, that "for an unknown period of time, probably ever since the Potomac valley was settled, if not long before, the woods of 'Cooney,' the old ante-bellum popular term for that part of Alexandria and Fairfax counties bordering on the Potomac, have been occupied by a vast colony of crows. They now roost in the grand old oaks at Arlington. Years ago they occupied a strip of pines that grew back of the river above Georgetown."

Mr. H. W. Henshaw, of Washington, who has known of this roost for about sixteen years, tells me that the crows about Washington come in from the surrounding territory by three main streams, the largest coming from the south, down the river; the next in size from the east, flying over the city, and probably feeding along the shores of the Eastern Branch of the Potomac, and the third, scattering, from the west and southwest in Virginia. During cold or stormy days they do not disperse so widely and stay about on the Potomac flats near the city. Last year there were estimated to be 40,000 or 50,000, but this year probably twice as many. The main colony is of two or three bodies within the

area of a square mile. The roosts are not exactly continuous, but pretty close together, according to the clumps of trees. The fish crows are about one to five in proportion to the common crows.

In Baird, Brewer and Ridgeway⁽⁹⁾ is an account of one of these colonies of crows, possibly journeying northward, "from the lips of the late John Cassin, an ornithologist hardly less remarkable for his outdoor observations than for his researches in the closet." On a Sunday morning in April, 1868, when Philadelphia was enveloped in an impenetrable fog, a body of crows numbering hundreds of thousands alighted in Independence Square. "As if aware of their close proximity to danger, the whole assembly was quiet, orderly, and silent. A few birds, evidently acting as leaders, moved noiselessly back and forth through their ranks, as if giving tacit signals." Then scouts departed to explore, and upon their return the leaders again went cautiously through the ranks. But they did not move until another exploring party had made its report, apparently more favorable, then "the whole of this immense congregation rose slowly and silently, preceded by their scouts, and moving off in a westerly direction, were soon lost to view."

The fish crow (*C. ossifragus*, Wils.) is confined to the Atlantic seaboard from Long Island to Florida, and the common crow (*C. americanus*, Aud.) is most numerous east of the Rocky Mountains. W. W. Cooke and Otto Widemann⁽⁸⁾ say that the common crow is a resident of St. Louis and vicinity, roosting by thousands in winter among the willows opposite St. Louis.

In a note in the *American Naturalist* for December, 1887, Mr. W. Edgar Taylor⁽¹⁰⁾ signalizes a roost "covering perhaps four or five acres, on Hog-thief Island, in

the Missouri River, about six miles above Peru, Neb.” “Two other good sized roosts are known, one ten miles north, and the other on an island eight miles south of Hog-thief Island.” Mr. N. S. Goss, author of “Kansas Birds,” is quoted as saying that several large roosts exist in Kansas.

Mr. Taylor says the Hog-thief Island roost has been occupied for at least twenty-five years. “The crows assemble about the first of October and disperse about the first of May. About daybreak on a fine morning, when setting out for a day’s journey, their chatter and noise may be distinctly heard in Peru, six miles away. The crows in severe winters peck holes in the backs of hogs, in some cases eating off the ears. Sometimes these crows roost in small bushes and large weeds, but generally in trees, often the willow or cottonwood.”

In the great region west of the Rocky Mountains we practically leave the haunts of those species of the crow genus heretofore considered, and enter the land of the largest of crows, the American raven (*C. corax sinuatus*, *Wagl.*). It is interesting to learn from Baird, Brewer and Ridgeway⁽⁹⁾ that the ravens form winter colonies much as our eastern species. Dr. Coues is quoted as observing them “congregating in autumn and winter, about Fort Whipple, Arizona.” Their roost was in the pines near the small enclosure where the beeves were slaughtered for the garrison, “and the banqueting there was never ended” upon the offal. Also Captain Blakiston observed them near Fort Carlton. They keep together in pairs during the day, but at night roost in one immense body in a clump of aspen trees about a mile from the fort. The incoming and outgoing of the ravens from the roost was with wonderful regularity. They assemble about sunset and disperse about half an hour before sunrise.

Mr. Watase (a Japanese student in this University) tells me that there are vast numbers of crows in Japan, especially in the northern part, where they do immense damage to the crops. In Tokio, in the great forest called the Emperor's Garden, right in the heart of the city there is a colony of many thousand crows which have their nests there, and at dusk from ten miles about they gather at this rookery. Some ten or fifteen years ago a law was passed in Japan that the crows be exterminated. All their nests were torn from the trees and policemen were dispatched in every direction to kill them. Thousands had been destroyed when some thoughtful person suggested that the crows were of great value to the city as scavengers, then the carnage was ordered to be stopped, and to-day, protected by law, they are apparently as numerous as ever. But where the crops suffer from crow depredations, as in the north of the empire, the law giving a bounty of five cents for every crow's head is still in force, and there are men who do nothing but go about killing crows, and indeed make of it a lucrative business. The crows sometimes become so violent that they attack the trains of pack mules which carry fish inland from the seashore. They pick off the flesh from the mules' backs, pluck out their eyes, and at times become very dangerous and violent, so that it is with great difficulty that they are driven off. There are three species in Japan, *Corvus japonicus*, which is distinctly Japanese ; *Corvus corax*, which is said to be identical with our own raven ; and *Corvus corone*, the common crow of Europe.

The colonies, which are formed only for the winter, come together late in the fall and break up in the spring, following the generally accepted laws of bird migration. In the report of Mr. Jones, of Reedy

Island, in part given above, he says that the crows come from the first of September until it gets cold, and begin to leave by the first of April, until in the last of May none are left. While at St. Louis, Cooke and Widemann⁽⁸⁾ say that by March 14th most of the crows have left the winter roost.

The main element bringing them together in a common body at night, I take it, is the social. In the choice of a roost, scarcity of mankind and access to food, combined with a growth of trees available for roosting upon, are the principal points considered. A region once selected is kept for a great many years, if there is no very decided disturbance to cause emigration.

In the following study of the colonies at Arbutus and Avondale, Md., I have attempted to describe the life of the colony during the twenty-four hours of day and night. The facts given are from observations made by the writer during the winters of 1886-87 and 1887-88.

A.—THE ARBUTUS ROOST.

Seven miles southwest from Baltimore, a half mile southeast of Arbutus station on the Baltimore and Potomac Railway, is a tract of land of about a half mile square on which are several patches of woods which furnish the roosting ground and its neighborhood for a winter colony of crows. It seems from the testimony of the owners of this land that the crows have roosted there for about twelve years, having previously occupied a piece of woods a half mile or more to the westward, which they abandoned when house-building and wood-cutting by the inhabitants made it undesirable. Although this ground has been for some years the headquarters of the colony, yet it has during that time made temporary changes to

places within a radius of one or two miles. Within this more extended limit, in the memory of "the oldest inhabitant," which individual has lived near Arbutus for over half a century, the crows have come to make their winter colony.

Dr. Godman⁽⁴⁾ says "such roosts are known to be thus occupied for years, beyond the memory of individuals; and I know of one or two which the oldest residents in the quarter state to have been known to their grandfathers, and probably had been resorted to by the crows during several ages previous."

There is in the first mentioned half-mile tract one particular piece of woods containing about fifteen acres of ground which seems to be the favorite roosting place of the crows, and from which, according as their numbers increase, they overflow into the surrounding woods and bushes. The trees are mostly of black oak, with some chestnut, white oak, poplar and other common forest species, all of a decidedly "scrubby" growth, not being on an average more than 25 or 30 feet high. The woods are situated in a sort of valley quite surrounded with hills which have been cut into jagged, fantastic forms in the several centuries of digging by the inhabitants for the rather poor iron ore of the region. The dumping of the refuse from these excavations in the hollow or valley has caused huge mounds here and there, and these, together with the well eroded slopes of the small hills, give a decidedly picturesque outlook to the arid land.

The country being of poor soil is sparsely settled, and a glance at a map on which all of the houses are indicated shows in a striking manner that this roost is in a region where are fewer houses than for miles around it. So these persecuted birds over whose heads

the Maryland statutes of outlawry have been hanging for almost two hundred years, would be stupid indeed if they had not learned to avoid man and his gun on every possible occasion, and to seek the most secluded spot available for a roosting place.

The neighboring farmers, with unusual good sense, seem to appreciate the value of the crows, rarely disturbing them, and how far the colony understands this I will of course not attempt to say.

On a bright sunshiny day, up to within about two and one-half or three hours of sundown, the only crows discoverable are the few which remain to feed in this territory, as their allotted ground, when the colony at dawn breaks up for the day. Perhaps in addition some that are blind or sick, too weak to fly far away, have remained at the roost. On a foggy or snowy day, however, more linger about all day, the main body is considerably delayed in dispersion, and the crows come in earlier in the evening. Now, by about three hours before sunset on a clear day, evidently having secured their daily rations, these few fly to above one of the several gathering grounds of the large flocks or detachments of the main body of crows which are to come later. In the course of an hour the few already in are joined by one now and then until quite a number have come together, screaming out their *caws* vociferously and discordantly. This small flock may perchance fly over into the woods a mile to the westward, and by the time it returns in the course of fifteen or twenty minutes will have grown to a very large flock. As it settles down on a near corn field with much fluttering of wings and very successful attempts at making a great noise, its individuals nervously hopping or flying from one spot to

another, one is reminded of a flock of overgrown black birds at the migrating season foraging in some stubble field for food. Suddenly from some common impulse the flock rises and moves away on an excursion for perhaps three or four miles. As the crows rise and start away their noise is, if possible, increased, but gradually dies out as they approach the distant hill, and is quite lost before they disappear to sight on its further slope. When they are gone the wintry field which for an hour has been associated with the noisy birds seems quite desolate.

But now as the sun is becoming large over the western hills we see in almost every direction, singly, in pairs, in small groups, the crows centering toward the roosting ground, and by the time the flock we first observed returns from its excursion it has become decidedly reinforced. Before settling down the flock may again wander off for two miles or more, but so many new individuals are arriving that a number do not join the main body, but seek the tops of the black oaks as if settling for the night. It is about sunset when these first ones alight, and it is not long before twenty or thirty of the nearest trees on the edge of the woods will each have seven or eight black figures perched upon its topmost branches.

Just as the sun is sinking below the horizon the flock which wandered away returns, and so many more crows have joined the force that it has grown to immense proportions. The sunset appears to be the signal for all crows, individually or in flocks, to centre at the roost. They come then in long streams, irregular in outlines perhaps, but rather constant in numbers, and after sunset the incoming is almost without noise, save the sharp whirring of their wings.

Audubon⁽³⁾ says : " They may be seen proceeding to such places more than an hour before sunset, in long straggling lines and in silence, and are joined by the grackles, starlings and reed birds, while the fish crows retire from the very same parts to the interior of the woods, many miles distant from any shores."

Also Dr. Godman⁽⁴⁾ observes that " endless columns pour in from various quarters, and as they arrive pitch upon their accustomed perches, crowding closely together for the benefit of the warmth and the shelter afforded by the thick foliage of the pine. The trees are literally bent by their weight, and the ground is covered for many feet(?) in depth by their dung, which, by its gradual fermentation, must also tend to increase the warmth of the roost."

But among those which have settled upon the perches there is a good deal of *cawing*, which may serve to guide to the roost their fellows belated in the dark or storm. At times, if unusually disturbed, instead of remaining upon the trees they will fly back and forth and high into the air, making considerable noise. Those coming in sometimes answer this signalling, especially if, as I witnessed in the case of a heavy snowstorm in December '87, they may have cause to be confused. As they appear suddenly from out of the distant darkness, or from the thickest of the swirling snow, a spectre procession without beginning and without end, one is haunted by the weird reality of the ghostly scene. We seem to be looking at Poe's " Raven " and all its earthly relations, coming as mysteriously as did that uncanny guest, in a series that shall end " nevermore !"

This body, however, is but one branch of what we must now compare to a vast army of crows. And as

this division is marshaled into camp, from at least two other directions great bodies are coming in streams, settling down upon the trees or flying high above them, outlined against the red after-glow of the sun. The air, as far as one can see toward the west, seems literally alive with crows. It is as if one of those huge swarms of gnats which we are all familiar with in the summer sunshine had been magnified until each individual gnat was as large as a crow, without any diminution in the total number of individuals.

In the winter of '86-'87, as one of a party from Baltimore, I saw one of these vast divisions coming in for the night with singular regularity. It came from the northeast, and as it approached our point of observation was somewhat hidden by a clump of trees, until within a hundred yards of us the procession made a sharp bend and the crows were directly over the woods which constituted the roost. If you will imagine a river one hundred and fifty feet wide and about thirty feet deep, its end a huge cataract by which the water falls to lose itself in a large lake, its beginning farther away than the eye can see, and if instead of water you will make this river of crows not so closely packed but that they can fly easily, and make the swiftness of the current equal to the ordinary flight of the crow, you may gain some idea of the stream which our party watched for over an hour without noticing any diminution in its bulk. And what a lake it made ! When a gun was fired the crows rose above the woods like a great black cloud, and when they settled again every available branch of the thousands of trees was utilized to afford them resting places.

Mr. Rhodes⁽⁶⁾ says : "The aerial evolutions of this descending multitude, coupled with the surging clamor

of those which have already settled as successive reinforcements appear, and which at a distance greatly resembles the far-away roar of the sea, may justly awaken emotions of sublimity in the spectator."

The crow is ever a wary bird, and even after having perched for the night is easily disturbed. If one walks through the woods where the crows are roosting, the nearest ones rise with the *caw* of alarm and fly over the trees to the farther edge of the main body. If one walks steadily toward them they keep as steadily giving way in orderly wave-like retreat. I have thus followed this colony from copse to copse through the whole neighborhood of its roost. If while walking one but stops, with no other movement, the crows immediately suspicion some treachery and there is a noisy stampede of all within danger. Very probably they have learned that a gunner always halts when about to shoot.

On the morning of February 19th I saw the colony disperse for the day under peculiarly favorable circumstances. The sky was perfectly clear and well lighted by the stars and the moon in its first quarter. We reached the field within 100 yards of the roost about half-past three o'clock in the morning. Because of some noise in walking over the frozen furrows, a few of the nearest crows took alarm at our approach and flew back a few rods into the woods; but this without the slightest noise, save the cracking of some branches or the whirring of their wings in the retreat. For over two hours all at the roost was silent as a graveyard, except that every now and then some restless individual, a sentinel perhaps, would utter a most peculiar croak, just like the louder note of a bull-frog.

But just an hour before sunrise, when the east was

becoming faintly lighted, the crows suddenly commenced awakening, and at the same time commenced cawing. The few who led the measure were within one or two minutes joined by the full chorus of 300,000 or more voices, each apparently striving to be heard by all the rest. Never before had I realized the almost infinite possibility of the crow's variable *caw* in the production of discords. This great noise, which the poetic soul of Audubon conceived to be "*thanksgiving*" and "*consultation*," was kept up for twenty minutes before any movement was discernible. Then about a dozen crows started off for the day's work, followed by more and more, until they were going from the roost much as they return to it in the evening, in the three or more large streams. The crows, however, were much more scattered in the order of flying than in the evening streams. After they had been leaving thus for about twenty minutes, the streams constantly growing larger, a common impulse seemed to move a large number of crows, and they did not wait to "fall in" as individuals, but suddenly joined the stream as a large flock. The streams were thus swollen in bulk quite regularly about every five minutes until the colony had dispersed. In an hour's time, or just at sunrise, the whole body, with the exception of twenty or thirty, evidently too weak to go far off, had left the roost. All this time the din of the general body does not seem to diminish, those left behind apparently doing double duty in the *thanksgiving*, while those going away, as far as one can hear, do not fail to keep up their cawing. In this respect they differ from the evening streams, which in the main come in with but little if any noise. In seeing this morning dispersion I think one is impressed even more than in

the evening with the vast number of crows constituting the colony.

In the daytime the individuals are scattered all over the surrounding country, seeking food in the fields, along the shores of bay, river and creek, one and two together, and then in rather large flocks at the glue factories and stock-yards if there chance to be such rich grounds in the neighborhood. They disperse to a radius of from one to about forty miles over the fields and along the water courses. I have seen them scattered all the way from Baltimore to Philadelphia on the one side and to Washington on the other. Of course these crows were members of two or more colonies.

Mr. Rhodes⁽⁶⁾ says that "during winter a radial sweep of one hundred miles, described from the city of Philadelphia and touching the cities of New York, Harrisburg, and Baltimore, will include in the daytime, in its western semicircle, fully two thirds of the crows (*C. americanus*) inhabiting North America, and *at night* an equal proportion in its eastern half." Mr. Rhodes was evidently not familiar with the fact of large numbers of crows wintering in the far South and the West.

That they fly from very long distances is shown by the fact that there are usually a few individuals coming in with the main body who, upon reaching the roosting ground, are so exhausted as to be unable to fly, and can only hop about as best they may to escape their ground enemies. Upon Dec. 17, 1887, were caught two of these crows which, if I may so express it, had the *flyer's cramp*, for in every other respect they were apparently in good condition and are now in sound health. That the muscles of flight had suffered a partial paralysis is shown by the fact that in the

course of a week they had so much recovered that had not their wings been clipped they would probably have flown away.

The successive layers of autumn leaves and excrementa left by the crows in winter have formed a remarkably rich compost for the naturally rather poor soil. Upon a field formerly a part of the woodland which formed this roost, but from which the trees were cut three years ago, much larger crops have been produced than from neighboring fields. Upon this ground many plants new to this part of the country, such as "river weeds," have been noticed by the farmers. In some of the excrements from this roost sent to Dr. Merriam were identified the seeds of the sumach (*Rhus glabra*) and corn, but the seeds of a species of plant much more numerous than either of these could not be identified. Among the small stones, bits of brick and sand and broken shells were found fragments of *Modiola hamatus* and *Arvicola riparius*. Thus it is evident what an important part the crows play in plant, and possibly animal distribution.

In this colony I have identified both the common crow (*Corvus americanus*, Aud.) and the Fish Crow (*Corvus ossifragus*, Wils.). The two species live together very contentedly, although probably in the main seeking different feeding grounds. I believe the common crows are much the more numerous of the two ; but on the wing they are scarcely distinguishable, except by voice, and so the exact proportion of the two kinds is virtually unattainable.

It is an interesting although rather discouraging operation to attempt to separate the variously intoned caws and imagine the condition of mind each one represents. It is a veritable Babel! Old crows, with

a voice like the rasp of a file as it plays on the edge of a saw; middle-aged crows, with long-drawn caws that have andante movements about them, destined to linger in one's ears after the musical apparatus has vanished from sight; and young crows, just learning the difficult art of expressing their emotions, who get along excellently until all of a sudden their note terminates in something totally unexpected, like a boy at the adolescent age, when he is never certain whether he will talk falsetto or base. But in all these different shades of tone there is that one unmistakable nasal basis which so clearly distinguishes the crow's caw from all other bird notes.

C. C. Abbott⁽⁵⁾ says: "Crows have twenty-seven distinct cries, calls, or utterances, each readily distinguishable from the other, and each having an unmistakable connection with a certain class of actions; some of which, as for instance the many different notes of the brooding birds, are only heard at certain seasons." Though we may not agree with such an exact classification, yet it is undoubtedly true that crows express quite different states of mind by quite different notes.

A determination of the exact number of crows here collected is not possible, but even the most sober observers place it among the hundreds of thousands. As a basis for an approximate calculation, I have made the following observations at the roost. With the aid of two friends, fifteen different square rods, taken here and there at random, were paced off, and the number of trees thereon capable of furnishing roosting tops counted. An average gave us nine and three-fifths trees per square rod. At any one roosting the crows occupy about ten acres, or $(160 \times 9\frac{3}{5} \times 10)$ 15,360 trees. If on each tree fifteen crows roosted—and that, if anything, is not too

large an average—we should have 230,400 crows in the colony.¹ Because of the dim light at sunset, my attempts at taking instantaneous photographs of the incoming streams of crows were failures. A view, however, of one of the gathering flocks, taken about an hour before sunset, as it flew by in a straggling stream, shows two hundred and seventy-three crows in the photographic field. On this basis, the flying time (an average of a number of observations) for the bird to cross the field being fifteen seconds, in three streams coming in for one hour we should have 199,560 crows. But the streams toward the middle and end of the incoming are manifestly much larger than the above, so this number may be taken as a minimum estimate.

Dr. Godman⁽⁴⁾ says: “During hard winters many crows perish, and when starved severely, the poor wretches will swallow bits of leather, rope, rags, in short anything that appears to promise the slightest relief.” I have often found crows sick of various disorders which I shall not attempt to classify, going blind and starving, and in the aggregate for a winter many suffer the inevitable fate of mortals. I have found as many as eleven sick and recently dead crows upon the roosting ground in one day, and no doubt the hawks and opossums have found as many, for they are so boldly fond of the birds as to become noticeably increased in numbers in the region of the roost in winter, and of their visits well picked bones scattered about bear testimony. But the consumers of crows are not confined to hawks and opossums, for there is an

¹ It is difficult to realize the meaning of such a large number, and perhaps an illustration may help us. It happens that if one crow came in each second, day and night, it would require just 64 hours for this number to assemble.

old colored man in the neighborhood who eats the fresh birds, and when his larder is abundantly supplied, salts down the crows for future use.

Having the total population of the colony and the average death rate we may calculate the average age of the crow. I think that a death rate of five for each night at the roost, drawn as an average from a number of observations, is certainly not too low. Allowing that during the almost equal period the colony is away from the roost the same number die, we then have a daily death rate of ten, or a yearly mortality of 3650 crows. So a colony of 230,400 individuals would be a fraction under 80 years in dying off; or in other words, the potential longevity of the crow would equal about 80 years. It is well known,¹ at least traditionally, that the crow is of remarkably long life, and although, as is easily seen, there are many obstacles in the way of anything but the barest approximation, yet I believe the above calculation is founded upon factors approximately correct.

Through the kindness of Dr. Pattison, of Baltimore, I have been made aware of a roost near Avondale, Carroll County, Md. I visited this colony March 3d, spending half a day at the roost and in the immediate vicinity. The crows here have selected the slope of a high hill upon which is a thick growth of deciduous trees, the oak and the chestnut prevailing. This hill

¹“This bird sometimes lives for a century or more. Those have been seen in several cities of France which have attained this age, and in all countries and in all times it has passed as very long-lived.”—Buffon, *Histoire Naturelle*, Tom. XVIII, 1775, p. 32.

“The raven likewise is reported to live long, sometimes to a hundred years. . . . But the crow, like unto him in most things (except in greatness and voice), lives not altogether so long, and yet is reckoned amongst long livers.”—Bacon, quoted in *Essay on Comparative Longevity in Man and the Lower Animals*, Lankester, London, 1870, p. 67.

belongs to a range extending some fifteen or twenty miles from northeast to southwest, parallel to the mountains which, some twenty-five miles away, can be seen from its crest. The exposure of the slope is toward the south, and so the crows in adopting this site are quite protected from the cold northern winds which prevail in winter. There are large tracts of woods adjoining this roost, but only when driven away by shooting do the crows leave this favorite hillside. They have roosted here for about ten years.

The general life of this colony is much as at the Arbutus roost, and I should judge the two colonies to be of about the same size.

CROW LEGISLATION.

The legislation upon crows in Maryland has been quite extensive, the first law for their destruction having been framed in 1704, in connection with one for the destruction of wolves. A part of the section relating to crows is as follows: “. . . Every person that shall bring or cause to be brought to any of the Justices of the peace in any county within this province the head of a Crow with a perfect Bill shall be allowed the sum of six pounds of Tobacco and the Justice of the peace before whom such Crows heads shall be brought shall cause the Bill to be cutt off to prevent the deceit of twice or oftener paying therefore.” This law, in 1707, was continued for three years, then revived in 1710. In 1713 a new act was passed putting the squirrels also upon the list of outlawry. This act was continued in force by supplementary acts in 1716 and 1722. In 1728 a new general “act to encourage the destroying of wolves, crows and squirrels” was passed. In it we find that “every

master, mistress, owner of a family, or single taxable, in the several and respective counties within this province" shall be obliged to produce "three squirrel scalps or crows heads for every taxable person they pay levy for that year." The penalty of not producing the required number of scalps or heads was two pounds of tobacco for each one lacking, and for any in excess a like allowance was made. This law was in force for thirty years, when it was repealed, and an act specifying four squirrel scalps or crows' heads was substituted.

Special laws for redeeming heads or scalps in excess of the requirements of these general laws were passed for different and various counties of the State, in 1749, '62 (Baltimore Co.), '94, '95, '96, '98, 1803, '04, '07, '09 and '16. In 1824 all acts heretofore passed for the destruction of crows in the several counties of this State were repealed. Then new special laws were passed in 1826, '29, '30, '31, '46 and '47. In 1860, with the adoption of the first general code of laws for Maryland, Art. 31, concerning crows, was inserted. In it was specified a bounty of 6½ cents for each crow's head brought in, provided an oath was taken that the crow had been killed in the county where claim was made. In 1864, '78, '80 and '84 (Baltimore Co.), the law was repealed for certain counties. In 1882, '84 and '86 new special laws associating with the crows "hawks and big owls" have been passed.

I have consulted the general statutes now in force of all the States, and find only in one other State, Virginia, that a law concerning the destruction of crows is extant. As early as 1796 a law was there passed requiring for every tithable six crows' heads or squirrels' scalps. In the Code of Virginia for 1873 the right is

given to each county to "allow or discontinue rewards for killing in such counties panthers, wolves, foxes, wild cats, crows or blackbirds."

I have read statements of laws having been passed in the early days of New England, and of such large numbers of crows having been destroyed in one season that, the crops for the next season suffering a like fate from the cut-worms and other insects, the inhabitants by repealing the laws were glad enough to encourage the crows to come back.

The general effect of these laws has been to cause the destruction of large numbers of crows. Dr. Godman⁽⁴⁾ has with graphic pen described the methods of hunting and slaughtering them in Maryland in the first years of this century.

It is interesting to learn from Mr. Henshaw that such near relatives of the crow, the blackbirds (*Argelaius gubernator*, Wagl., and *A. phoeniceus*, Linn.) at San Luis Obispo collect in the fall and winter in immense flocks and roost in the swamps of tulle (a kind of bulrush). They do not come in to the swamp in streams, but in large flocks, and these diving down into the reeds are very soon hidden.

This dwelling together in large flocks is also quite true of the crow blackbird or purple grackle (*Quiscalus quiscula*, Linn.), as we see in this latitude after the breeding season and until migration, and in the South during the winter.

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