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No. 7: THE PASSENGER PIGEON IN ONTARIO,
BY MARGARET H. MITCHELL.

PUBLISHED UNDER
THE REUBEN WELLS LEONARD BEQUEST

1935

PASSENGER PIGEON (Male)

Ectopistes migratorius

From the original painting, dated 1835, by William Pope. The original is in the Toronto Public Library and is reproduced by their permission.

THE
PASSENGER PIGEON
IN
ONTARIO

BY
MARGARET H. MITCHELL

PUBLISHED UNDER
THE REUBEN WELLS LEONARD BEQUEST

THE UNIVERSITY OF TORONTO PRESS
1935

*“And pigeons darkening many a mile
Roar like a tempest o’er the wood.”*

(Alexander Wilson.—“The Pilgrim”)

INSCRIBED

TO

PAUL HAHN

*Who over a period of years has collected
and generously donated to the Royal Ontario
Museum of Zoology the majority of the speci-
mens of Ectopistes migratorius in its possession.*

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PHOTOGRAPH OF HABITAT GROUP IN THE ROYAL ONTARIO MUSEUM OF ZOOLOGY. THE SCENE
REPRODUCED DEPICTS AN APRIL MORNING IN THE 1860'S NEAR FORKS OF CREDIT, ONTARIO.

INTRODUCTION

ONE of the most fascinating chapters in the annals of North American wild life is filled by the history of the passenger pigeon. Occurring in numbers that seem to have exceeded those of any other bird of which we have record, the species would command the attention for that reason alone, even without the additional fascination of being now extinct.

We have to-day this history complete, and it is possible to trace it from misty beginnings in the Pleistocene to the death of the last survivor, Martha, who died at the age of about twenty-five in the Cincinnati Zoological Garden in 1914.

Much has already been written of these birds, beginning with accounts from early travellers and pioneers and ending with the more scientific records of such men as Forbush and Barrows. However, nothing as exhaustive as this monograph has ever been attempted. W. B. Mershon and J. C. French made valuable collections of information for their respective States of Michigan and Pennsylvania, but as they themselves assert they were both simply interested and enthusiastic laymen. It is felt, therefore that the present work has a definite contribution to make to the knowledge of an extinct species. It not only preserves such information as we have concerning passenger pigeons in the province of Ontario, but it also covers rather fully several aspects of the birds' life-history which have before been only touched upon. Enumerating the most important, they are: food; northern limits of occurrence and nesting; variation in numbers; fixed migration routes, and finally, a new theory of extermination which divests former theories of much of their uncertainty and mystery.

This breadth of scope was not definitely realized when the work was begun. In 1926 the Royal Ontario Museum of Zoology issued a questionnaire, as a means of assembling information on the subject of wild pigeons from Ontario residents who remembered them. It was distributed widely in the province and a mass of detail was obtained in the answers. At first it was thought that the mere tabulation of these answers would be sufficient, but it was gradually realized that much more supplementary material was to be found in early Canadian and American literature. Then as data were obtained from these various sources and arranged, it was further apparent that sufficient reliable information warranted the

making of certain statements and the formulation of theories as enumerated above.

The plan of this book is based roughly on the Museum questionnaire, that is, the order of the subject headings follows that of the questions. The information derived from the questionnaires is, wherever possible, supplemented by extracts or information from the literature. Also several extracts and one or two articles deemed sufficiently important are to be found in an appendix together with a copy of the questionnaire.

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THE PASSENGER PIGEON IN ONTARIO

RELATIONSHIP OF PIGEONS

There are distributed throughout the world about five hundred species of pigeons which are divided into five main families, to the second of which, the Columbidae, belong the dozen or more species to be found in North America. Of these only three occur north of the more southern States—the band-tailed pigeon (*Columba fasciata fasciata*), a western species confined to the Pacific coast—the mourning dove (*Zenaidura macroura*), more eastern in its distribution—and the passenger pigeon (*Ectopistes migratorius*) with the widest range of all, occurring once from the Mackenzie District to the Gulf of Mexico and from the Rocky Mountains to the Atlantic seaboard.

The passenger pigeon's relationship to other pigeons was indicated by the possession of many of the usual characteristics of appearance and habit common to the family. Its beak and feet were slim and weak in proportion to its size; its plumage was thick and sleek, exhibiting the usual iridescence on the sides of the neck. Its nest was crudely constructed; the eggs, white; the young altricial and fed with regurgitated curd. It drank (as do pigeons distinct from all other birds) without lifting the head, and fed largely upon vegetable material—fruit, seeds and grain.

In general appearance the passenger pigeon differed considerably from practically all others of the family, being slimmer and more pleasingly proportioned. This was due to its tail, which, in distinction from the rather short, square tail of the majority of pigeons, was long and definitely pointed, and balanced the heaviness through the shoulders which is so characteristic of pigeons in general.

The nearest relative of the passenger pigeons' (*Ectopistes migratorius*) is the mourning dove (*Zenaidura macroura*), and there is a distinct resemblance between the two. Their build is similar; they possess, proportionately, the same length of neck, giving the sloping shoulder outline, the same long pointed tail, and the same slim, trim aspect of the whole body. A comparison of the two will show, however, a distinct difference in colouration, the passenger pigeon being, even in the female, more brightly and definitely coloured, while the softer shades of the mourning dove blend almost imperceptibly one into another. There was also a considerable difference in size between the two, the wild pigeon measuring about sixteen inches while the dove is only about eleven inches long. There were other differences: the wild pigeon seems to have been a more

vigorous and dashing bird with few of the accepted dove-like ways; it was noisy and its notes were loud and decisive, not soft and crooning as are the mourning dove's. Indeed it might appear significant that one is called a pigeon and the other a dove, but this is evidently of no importance scientifically. Newton's Dictionary of Birds (139) says: "No sharp distinction can be drawn between Pigeons and Doves, and in general literature the two words are used almost indifferently, while no one species can be pointed out to which the word Dove, taken alone, seems to be absolutely proper."

Ectopistes seems to have been unique among pigeons and doves in its habit of nesting in huge colonies in which the birds were closely congregated. Other species of pigeons have often distinct breeding areas where nests are found commonly throughout the trees but none seems to nest habitually in such a congested manner as did the passenger pigeon.

The huge flocks of this species were its greatest claim to distinction. They were unequalled in their enormous size and also in the fact that they were maintained to a greater or less degree practically throughout the whole year. Other pigeons exhibit nearly always a tendency to gather in flocks after the nesting season is over, and to wander about the country in this way during the autumn and winter, but the passenger pigeon flocked at all seasons of the year and, in the more northern part of its range, in flocks of larger size in the spring than in the fall, thus reversing the custom of the family as a whole.

RANGE

Ectopistes migratorius formerly occurred throughout eastern North America, from the Gulf of Mexico to the Mackenzie river valley and from the Atlantic seaboard to the Rocky Mountains. Its range is given in the American Ornithologists' Union check list (3) as: "Bred formerly from middle western Mackenzie, central Keewatin, central Ontario, central Quebec, and Nova Scotia south to Kansas, Mississippi, Kentucky, Pennsylvania and New York. Wintered principally from Arkansas and North Carolina south to central Texas, Louisiana and Florida. Casual west to Oregon, Nevada, Washington, and eastern Mexico; accidental in Bermuda, Cuba, the British Isles and Europe."

PALAEONTOLOGICAL EVIDENCE OF ORIGIN

It is fascinating to speculate on the origin and history of such a wide spread and extravagantly numerous species—when were they at their maximum and how many years did it take them to attain it? Had the

Indians known them in greater numbers than existed on the arrival of the white man? Palaeontological evidence shows pigeons to have been cosmopolitan since the Miocene, and a fossil dove is reported by Wetmore from beds ascribed to the Upper Pliocene of southern Arizona, so that it seems probable that North American pigeons had their origin many hundreds of thousands of years ago. In fact Dr. Wetmore says (188): "It is my belief that these two ages (Miocene and Pliocene) mark the period of evolution of our modern genera of birds, and that there has come comparatively little change in generic type since. . . . From somewhat meagre information I am inclined to regard the close of the Tertiary as the period of greatest diversity and abundance in bird life in the earth's history so far as North America is concerned, and to believe that with the rigors of climate incident to the opening of the Pleistocene, and even more unfavorable conditions of the historic part of the Recent Period occasioned by the increase of man over the earth, there has been steady reduction and extermination among birds, a process that will continue in spite of protective regulation until most of the peculiar forms have disappeared and only the more adaptable ones remain."

Shufeldt (158) has identified several bones of *Ectopistes migratorius* from the Pleistocene deposits of the Bone Caves of Tennessee, showing that it was established as a species in that period, and from Wetmore's suggestions may have been so for several hundreds of thousands of years. It has therefore had a long span of life, and it is strange to think that we to-day may look back to those dim beginnings which were taking place perhaps before even the red man came to America and may also see, within the memories of many of us, the writing of the last chapters of the species' history.

EARLY REFERENCES

Eastern America

Since "turtle doves" and "wood pigeons" were first mentioned by Jacques Cartier (16) as occurring in 1534 on what is now Prince Edward Island, there have been many and varied accounts of the passenger pigeon, ranging from mere references to such famous descriptions as those of Wilson (191) and Audubon (9). The majority of these concern the birds in their southern range, so that it may be more pertinent here to quote from such early accounts as have been found of them in Canada, understanding, of course, that in the sixteenth and seventeenth centuries Canada had somewhat different boundaries from those of the present.

In the "Jesuit Relations" (176) of the seventeenth century there are many references to the pigeon, the earliest being an account of its abundance in Acadia in 1610 (176a). In Le Jeune's Relation of 1636-37

(176d) he says: "In one season the turtle doves are sometimes found in such abundance that the end of their army cannot be seen when they are flying in a body; at other times in the same season they appear only in small flocks. . . .Our Savages are like them in this inconstancy."

The Relation of 1662-63 (176f) gives a description of a "Journey from the Entrance to the Gulf of Saint Lawrence up to Montreal" and quotes from an unknown writer: "Among the birds of every variety to be found here, it is to be noted that Pigeons abound in such numbers that this year one man killed a hundred and thirty-two at a single shot. They passed continually in flocks so dense, and so near the ground that sometimes they were struck down with oars. This season they attacked the grain fields where they made great havoc, after stripping the woods and fields of strawberries and raspberries which grow here everywhere under foot. But when these Pigeons were taken in requital they were made to pay the cost very heavily; for the Farmers, besides having plenty of them for home use, and giving them to their servants, and even to their dogs and pigs, salted caskfulls of them for the winter."

In later accounts pigeons are often referred to as being more numerous inland than at the seaboard, but there is much early evidence which shows that they were at one time quite as plentiful on the coast. Nicolas Denys (77a), describing a meadow on the lower part of a river emptying in the Bay of Chaleur, says: "On it are also a great quantity of Strawberries and Raspberries and here collects so great a number of Pigeons that it is incredible. I once remained there eight days toward the feast of St. Jean [June 24] during which every morning and evening we saw flocks of them passing, and of these the smallest were of five to six hundred. . . .They did not remain on the ground more than a quarter of an hour at most, when there came other flocks of them to rest in the same place; the first ones then arose and passed along. I leave you to imagine whether they were not killed in quantities, and eaten in all fashions."

Even one hundred years later they were still abundant at the seaboard. Campbell (36) says concerning New Brunswick: ". . .of pigeons, in the season, may be seen from any eminence 10,000 flocks, or as far as the eye can reach."

Lake Champlain was at this time in "Canada" and the entertaining Baron de la Hontan (177) tells of being near this lake in September, 1686: "After which we resolved to declare War against the Turtle-Doves, which are so numerous in Canada, that the Bishop has been forc'd to excommunicate 'em oftner than once, upon the account of the Damage they do to the Product of the Earth. With that view, we imbarqued and made towards a meadow in the neighbourhood of which, the Trees

were cover'd with that sort of Fowl, more than with Leaves: For just then 'twas the season in which they retire from the North Countries, and repair to the Southern Climates; and one would have thought, that all the Turtle-Doves upon Earth had chose to pass thro' this place. For the eighteen or twenty days that we stay'd there, I firmly believe that a thousand men might have fed upon 'em heartily, without putting themselves to any trouble."

In a later edition (91) there is a more detailed passage which is interesting to compare with the one already quoted; the contents are practically the same but the old French has a certain spice that is lost in the translation. "Pour changer donc de victuaille en gens d'honneur, et sans dégénérer, nous conjurâmes la ruine des tourterelles. Cette espèce est une des plus fécondes qu'il y ait en Canada; elle y fourmille: C'est bien ici où la Prophetie du Berger de l'Eglogue s'accomplit à la lettre, 'la tourterelle ne cessera de pousser ses gémissemens de dessus l'Orme, nec gemere aëria cessabit turtur ab ulmo.' Croiriez-vous que ces Oiseaux nous pillent ici, tant il y en a? On est contraint de les exorciser comme si c'étoient les legions de Diable, et il n'y a pas encore long-tems que notre Monseigneur l'Evêque fut contraint de les foudroyer a grosses gouttes d'eau benite, pour le falut des biens de la terre."

Peter Kalm (81), the Swedish naturalist, after his travels through America, wrote an excellent article on the passenger pigeon in which he says: "The Birds spend the entire summer in Canada, and particularly do they nest in the vast wild forests and wastes which abound there, where no men are to be found and where seldom any human being ventures. When in the summer a person travels through these forests he might easily be terrified by the enormous number of these birds, which in some places almost entirely cover the branches of the trees and, when taking wing obscure the sky."

Indian Legends

It appears rather strange, under the circumstances that there is apparently very little reference to this amazingly spectacular creature in Indian folk-lore. It seems natural to suppose that a bird possessing such great beauty and living in such an overwhelmingly "grand manner" would have become closely linked with the observances and fables of a nature worshipping race. Perhaps this was actually the case and it is merely that such instances have never been recorded; on the other hand it may be that pigeons were such a common occurrence that they were considered purely from the point of view of provender, with no romantic glamour about them.

After considerable searching I have found only three stories of Indian origin—two from the Hurons and one from the Neutrals. In the "Jesuit Relations" of 1636 (176c) in a chapter headed "The Ideas of the Hurons Regarding the Nature and Condition of the Soul, Both in this Life and after Death" Le Jeune says: "At the feast of the Dead, which takes place about every twelve years, the souls quit the cemeteries, and in the opinion of some are changed into Turtledoves, which they pursue later in the woods, with bow and arrow, to broil and eat." Further on in the same Relation this idea is enlarged upon in the description of the Solemn Feast of the Dead, as practised by the Hurons: "Many think we have two souls, both of them being divisible and material, and yet both reasonable; the one separates itself from the body at death, yet remains in the cemetery until the feast of the Dead,—after which it either changes into a Turtledove, or, according to the most common belief, it goes away at once to the village of souls."

The Neutral story (61) tells of a great famine suffered by the Indians; all the animals had been driven away by terrible snow storms sent by the angry Manitou, all the lakes and streams were so frozen that fishing was impossible, and the Indians were starving. Then suddenly hosts of pigeons appeared each bearing in its beak a spray of huckleberries. These they dropped upon the villages and then flew away. The Indians followed them and after many days of searching at last found the great swamp from which the berries had been plucked and so were saved. It would be interesting to know whether this story is of true Indian origin or whether it received its inspiration from the story of Noah's dove.

Early References in Ontario

The history of the passenger pigeon in Ontario is really the history in miniature of the species in North America. It passes through all the stages from abundance in pioneer days to scarcity and extinction within the memory of men still living.

Upper Canada, which conformed to the present boundaries of Ontario in all except its northern limits, was formed in 1791 and a map of that period shows only York (Toronto) and Kingston as places of any importance, so that although there was a fringe of farms and tiny settlements along the lake shores this great tract was still practically untouched by man; and if passenger pigeons were at the time said to be diminishing at the seaboard due to the encroachments of civilization they must have been almost undisturbed in what was later to become Ontario. This whole area was heavily timbered with maple, oak, elm, beech, pine, cedar and many more indigenous species. Great forests stretched away on every side from the new settlements, with few natural clearings and

in many places free of undergrowth, so close were the great trees. Here and there the monotony was broken by occasional lakes, a beaver meadow, or a larger opening such as the "Rice Lake Plains," but on the whole it was a region of heavy woods; and these conditions prevailed largely until the middle of the next century. For example I have gleaned the following facts from various accounts of old Ontario. In 1832 Goderich was still the most northerly settlement in the west and had at that time a population of three hundred (29). In 1836—as an instance of how slight settlement was—from Andrew Pickens' (145) account of conditions in the Canadas these items are taken at random: "Fenelon—*Soil*, little known. *Disadvantages*, very remote; not settled." "Esquesing—*Soil*, principally sand, clay in some parts. *Disadvantages*, lying in the rear of Trafalgar, and want of highways, mills, etc." And in 1840 there were few evidences of settlement except in the Niagara and Gore Districts (the present counties of Halton, Wentworth, Lincoln and Haldimand), in the Prince Edward region and along the Ottawa river. While in a Handbook (42) of 1866 it is surprising to read: "Toronto to Collingwood (via Ontario Simcoe and Huron Railroad)—on this route the country, as far as Lake Simcoe, of which a good view is obtained from the cars, is well settled, and the soil is generally excellent; but after passing Holland's Landing, the road is almost entirely through the forest."

As might be expected the country abounded in wild life. Deer were common, bears numerous, rabbits were plentiful and squirrels positively swarmed in certain localities in some seasons. Amongst the birds, woodpeckers were conspicuous, grouse were everywhere and in the lake regions water-fowl occurred in prodigious numbers during migration.

The first important reference to passenger pigeons in the newly formed Upper Canada is that of Weld (185): "A gentleman of the town of Niagara assured me, that once as he was embarking there on board ship for Toronto, a flight of them was observed coming from that quarter; that as he sailed over Lake Ontario to Toronto forty miles distant from Niagara, pigeons were seen flying over head the whole way in a contrary direction to that in which the ship proceeded; and that on arriving at the place of his destination, the birds were still observed coming down from the north in as large bodies as had been noticed at any one time during the whole voyage; supposing, therefore, that the pigeons moved no faster than the vessel, the flight, according to this gentleman's account, must at least have extended eighty miles. . . . It is not oftener than once in seven or eight years, perhaps, that such large flocks of these birds are seen in the country."

In 1822 Howison (92) says: "Long Point abounds with game of various kinds. . . . Immense flocks of the passenger or wild pigeon

frequent this and other parts of Upper Canada during the spring and autumn; and myriads of them are killed by firearms or caught in nets by the inhabitants," showing how soon upon settlement followed the local destruction of this bird and its subsequent retreat into the wilderness.

Some twenty years later Sir Francis Bond Head, in the vivacious and entertaining account of his residence at York during his Governorship of Upper Canada (87) says: "But while this joyful process is proceeding in the vegetable world, the interminable forest is once again becoming the cheerful scene of animal life. . . .The air is filled—the light of heaven is occasionally almost intercepted from morning till night—by clouds of pigeons, which, as the harbingers of spring, are seen for many days flying over the forest, guided, I have been credibly informed, by a miraculous instinct, not only to the particular remote region in which they were reared but to build their own nests in the very trees upon whose branches each individual bird was hatched! but if, as is well known they are instinctively led to the country of their birth, it is not improbable that, when they reach it, they will rapidly search out for themselves their own 'homes'."

The reminiscences of King (101) contain one of the best accounts of a flight of pigeons. This was published in 1866 but probably referred to an event of several years prior to that date: "While quartered at Fort Mississisauqua [sic]. . . .near Niagara, I had one year [probably about 1860] in the month of May, the gratification of witnessing a spectacle I had frequently heard of—namely, a grand migration of the Passenger Pigeon. . . .

"Early in the morning I was apprised by my servant that an extraordinary flock of birds was passing over, such as he had never seen before. Hurrying out and ascending the grassy ramparts, I was perfectly amazed to behold the air filled, the sun obscured by millions of pigeons, not hovering about but darting onwards in a straight line with arrowy flight, in a vast mass a mile or more in breadth, and stretching before and behind as far as the eye could reach.

"Swiftly and steadily the column passed over with a rushing sound, and for hours continued in undiminished myriads advancing over the American forests in the eastern horizon, as the myriads that had passed were lost in the western sky.

"It was late in the afternoon before any decrease in the mass was perceptible, but they became gradually less dense as the day drew to a close. At sunset the detached flocks bringing up the rear began to settle in the forest on the Lake-road, and in such numbers as to break down branches from the trees.

"The duration of this flight being about fourteen hours, viz. from

four a.m. to six p.m. the column (allowing a probable velocity of sixty miles an hour, as assumed by Wilson), could not have been less than three hundred miles in length, with an average breadth, as before stated of one mile."

This may be a rather exaggerated estimate, as undoubtedly there must have been many breaks in the column, but nevertheless it gives a most vivid idea of the still enormous numbers of this bird—numbers which make its subsequent extinction all the more amazing.

It is quite apparent that such game must have been of great importance to the pioneers from a purely economic standpoint. This is borne out by a report (54) sent by Colonel Henry Hope of Niagara to Lord Sydney in 1785 which states: "The quantities of wild pigeons and fish, which are taken in abundance during the same period [June 1st to September 1st] will contribute to their support, and I conceive an allowance of one pound of flour per day for grown persons and half that quantity for those under ten years would enable them to live on their lands to the 1st of September after which the crop of that year will abundantly support them."

It has also been said: "During the flight of these pigeons, which generally lasts three weeks or a month, the lower sort of Canadians mostly subsist on them" (4). Indeed some servants are said to have stated in their contracts that they would not eat pigeons more than so many times a week; and on reading the diary of Mr. Joseph Wilcocks (106) of York one wonders whether masters as well, ever had any comment to make on a monotony of diet. On August 10th, 1801, he says: "Had for dinner Roast Beef, Ducks, Pidgeons." Tuesday, August 11th: "We had for dinner cold beef, Pidgeons, hash and melons." And pigeons are included in the dinner menu on the following dates, August 13, 18, 19, 21, 22, 23, 25, 26, 29, 30, 31 and September 1, 3, 4 and 7.

In other pioneer accounts references are made to the pleasant change from salt pork that the pigeons made in their season, and how they were also salted down for winter use. Mrs. Traill (180) gives several recipes for cooking pigeons, among others one for Pot-pie; "Pigeons stuffed, larded and cooked in the bake-kettle, are very nice; and are tenderer, and more savoury than when baked in the stove. To make a pot-pie of them, line the bake-kettle with a good pie-crust; lay in your birds, with a little butter on the breast of each, and a little pepper shaken over them, and pour in a tea-cupful of water—do not fill your pan too full; lay in a crust, about half an inch thick, cover your lid with hot embers and put a few below. Keep your bake-kettle turned carefully, adding more hot coals on the top, till the crust is cooked. This makes a very savoury dish for a family.

"Pigeons are best for table just after the wheat harvest; the young birds are then very fat."

DISTRIBUTION IN CANADA—WITH REFERENCE TO ONTARIO

The broad outlines of the distribution of *Ectopistes migratorius* as given in the American Ornithologists' Union check list (3) have already been quoted, but when going into the matter more closely with Ontario in mind, several interesting facts appear.

This was a species essentially of the forest and a comparison of data on distribution of wild pigeons with that of forest distribution shows a close correlation. The heavily forested regions extend across Canada from east to west in a sloping line, from slightly north of 50° to slightly north of 60°, which seems to coincide with the known breeding range of the pigeon. Peter Kalm (81) sets the northern boundary for breeding at considerably south of this line in Quebec, but as so often occurs with scientists of a past age, his assertion was no doubt correct only according to contemporary information. He says: "These Pigeons have however their distinct boundaries, outside of which they do not often venture; as for example, somewhat south of Bay St. Paul, which is 20 French miles north of Quebec, not very many of them nest in the woods, and the cause of this is said to be that the oak and the beech tree, which supply them with their principal food, are here arrested in their growth, and grow no further north."

There is no doubt that pigeons nested more plentifully where mast was obtainable, yet we are told on good authority (Forster (74)) that they abounded at Moose Factory, and they also bred there (Hutchins' MSS (95)), which place is on the northern edge of the heavily forested area and far beyond the northern limits of oak and beech. Low (114) records the taking of a set of passenger pigeon eggs in 1887 at Fort George on the east shore of James' Bay which is between 53° and 54°, but this record is apparently open to question.

Eastern Quebec records are: Gaspé, said to have been numerous, until about 1845 (178), in fact they formerly "abounded" there according to Nicolas Denys (77b); reported from Metis and St. Anne des Monts by Robert Bell (18); Anticosti, very rare, one seen by Verrill in 1860 (141); Pte. des Monts, Quebec, a rare and irregular visitor (130).

From Labrador is the following report (179) also open to question: "Formerly very rare, now extirpated. . . . Cartwright (40) on August 22, 1775, in Sandwich Bay [about 53°] enters in his journal this note: 'Near the mouth of the brook we saw a pair of doves, and I killed one with my rifle; it was much like a turtle dove and fed on the berries of *Empetrum nigrum*. I never heard of such a bird in the country before and I believe

MAP 1—Forest distribution in Canada.

they are very scarce.' These may have been either Passenger Pigeons or Mourning Doves."

West of the province of Quebec the species was said to reach "62° in warm central districts and 58° in very warm summers on Hudson's Bay" (13). Forster (74) says: "These pigeons are very scarce so far northward as Severn river [56°] but abound near Moose-fort, and further inland to the southward."¹

Hutchins' MSS (95) states: ". . . one that I received at Severn,² in the year 1771, and, having sent it home preserved to Mr. Pennant he informed me that it was the migratoria species." But this bird, of course, might have been brought to Fort Severn from a considerable distance and so can only be considered as a record from the Severn river region.

"About twenty-six years ago these pigeons migrated up as high as York Fort [57°] but continued only two days" (95).

"The Passenger Pigeon was seen in small flocks in the upper part of the Nelson River in the beginning of September, 1878. It very rarely passes York Factory and has never been known at Fort Churchill," reports Robert Bell (20), while in contradiction of this Clarke (46) states that at Fort Churchill, [59°] a male and female were taken. These, with a collection of other birds, were presented to the Edinburgh Museum by Dr. Gillespie Jr., an officer of the Hudson Bay Company in 1845.

Ross reports it at Fort Norman, (65°) but as uncommon there, while Alexander Mackenzie found it in the Fort Good Hope region, about 66° (149). And showing that, although apparently irregular in this area, they were by no means always mere stragglers, Thomas Simpson (159) says that at Fort Simpson, about 62°, in the summer of 1837: "The fields here looked well, but had a troublesome enemy in the passenger pigeons."

Also to show to what extremes stragglers may go: "Capt. James Ross saw a single pigeon of this species as high as latitude 73½° in Baffin's Bay; it flew on board the Victory during a storm and must have strayed from a great distance" (11); while Morris' "British Birds" (135) records one shot in Fifeshire, Scotland, December 31, 1825.

It would seem therefore on the foregoing evidence, and aside entirely from great extremes, that all of Ontario was within the passenger pigeon's

¹This quotation having the word "river" with a small "r" might lead to the supposition that the *region* of the Severn river was meant but it is evident from the text that it refers to the settlement at the mouth of the Severn usually known as Fort Severn. All through Forster's notes he calls this settlement "Severn River," and the note on the passenger pigeon is headed "Severn River, No. 63. Wood-pigeon," so that it seems safe to suppose that the small "r" in the text that follows is a typographical error.

²"Severn" here being Fort Severn at the mouth of the river, since Severn House on Severn Lake to the southwest, was not built until much later, according to information from the Geographic Board of Canada.

range. It probably bred all over the province in the well forested areas, less commonly and more irregularly toward the north; and occurred irregularly to the limit of trees which coincides fairly closely with the Ontario shores of Hudson Bay.

NESTING COLONIES

In the history of any species of bird, nesting records are always the most important, and this aspect was therefore stressed in our inquiries. But when one realizes the great length of *Ectopistes*' sojourn in America it is evident that the information we have assembled in this way is merely a record of its declining years—for were they not reported as being "much diminished" about 1650, "the English taking them with nets" (98).

It must also be borne in mind, throughout this article, how very difficult it is to make positive statements concerning facts which are based largely upon the memories of others. Our memories play us strange tricks and nothing is more difficult than to remember exactly how and when a particular event took place. The desire for accuracy seems to have nothing to do with it. Dates, particularly, are hard to keep in mind unless connected with some important event in our own lives, and numbers nearly always have a tendency to grow rather than decrease in retrospect. So in the following tables dates can be, in almost every instance, merely approximate and many statements must be accepted with their perspective of, at the minimum, thirty years. I sincerely hope that no one who has in any way contributed to the information in this treatise, will take offense at these remarks. It is simply that the author does not want, in a work which purports to be scientific, to appear to make statements which might be challenged.

There are in Ontario fifty-five counties and districts; there are records of passenger pigeons occurring in fifty-three, and nesting in forty-five. These nesting records are more numerous in southwestern Ontario, and of course the question arises as to whether this was actually the case or whether it is merely that information is lacking from the eastern counties and northern districts, due to their smaller population. Possibly at one time wild pigeons nested in equal abundance all over the province south of a line from Ottawa to the French River, but as civilization drove them gradually westward they no doubt modified their migrations to suit changing conditions. Migration will be discussed more fully under its own heading and it will suffice to say here that towards the end of the last century one of the chief entrances to Ontario was by way of the Niagara peninsula. This with the close proximity of Michigan, their last great stronghold in the east, and also the fact of abundant food

supply, probably accounts for the concentration of breeding birds in the southwest.

Table 1 (p. 27) contains records of all the nesting sites which it has been possible to secure. Records of large roosts are included since

MAP 2—Showing nesting records of passenger pigeon in Ontario. The large dots indicate localities where nesting took place. The areas marked with small dots are those throughout which nesting was known to occur.

they were often so much a part of a nesting colony, even though a considerable distance away—a sort of commuting suburb—making their proper place seem under this section. Here also are placed “rookeries,” the significance of the word not having been given by the informant; that

(Continued after Table 1 on page 42)

TABLE 1.—NESTING COLONIES

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Brant.....	Brantford near Brantford	1875	Several patches of woodland		A roost only; knocked off trees in evening by farmers	W. C. Armstrong (6)
Brant.....	Dumfries S. around Paris		A few nests	Any small trees		Edward Axton, Paris
Bruce.....	Throughout the county from Southampton to Tobermory		In large numbers		Nested plentifully in this region before clearing of land	C. A. Fleming (66)
Bruce.....	Albermarle, Cp. Crocker.					Walter Davidson, Toronto
Bruce.....	Amabel, west of Wiarton.	1869	Thousands			Chas. Julyan, Owen Sound
Bruce.....	Amabel, west of Wiarton.	1870	Few			Chas. Julyan, Owen Sound
Bruce.....	Amabel.....	Apr. 28 1876	Large nesting		Noted in the Paisley <i>Advocate</i> for that date	M. Robertson (152)
Bruce.....	Amabel, Saugeen Indian Reserve.....		400 acres	Beech, maple, birch, elm		Chief Thos. Solomon
Bruce.....	Amabel, French Bay....		20 acres	All kinds, spruce and tamarack		E. J. Weatherall, Southampton
Bruce.....	Amabel, 7 miles from Allenford.....		About 5,000 birds	Cedar swamp		Geo. Baker, Allenford
Bruce.....	Amabel, Lot 13, Con. D..	May 24 1878	Hundreds of thousands	Cedar swamp	Might be same as above as from context it was in Amabel twp.	Thos. Bell, Southampton
Bruce.....	Kincardine.....	1875-76	In great abundance			Dr. G. A. MacLennan, Montreal

TABLE I—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Bruce.....	Kincardine.....					E. R. Cameron, Ottawa C. A. Stone, Toronto
Bruce.....	Saugeen, Southampton..					C. A. Stone, Toronto
Carleton.....	Gloucester, around Ot- tawa.....	1891	Rare			Lees, Kingston and Macoun (110)
Cochrane.....	Abitibi river, from the Canyon to Altar Falls..	1876- 78	Millions	Black and red spruce	"In the vicinity of Altar Falls there are a series of ridges that run across coun- try, and the pigeons usually nested along the water's edge in that section"	Joe Moore, Wawa Falls For more detailed discussion see under Occurrence
Cochrane.....	Mattagami river, Smokey Falls.....	1869- 72	Millions	Black and red spruce	Nested here for years before dates given and for some time after. Arrived in June in the region	
Cochrane.....	Moose Factory.....				From notes of T. Hutchins, H.B.Co.	Pennant (144)
Cochrane.....	Moose Factory.....	1772	"Abounds"			Forster (74)
Cochrane.....	Moose Factory.....	June, 1888	Set of eggs taken			Macoun (118)
Dufferin.....	Amaranth, Con. 3 and 4, side roads 10-15.....	1884?	In thousands	Black alder and other kinds	Nested in this area year after year. Mr. Davison says, "45 years ago," which, of course, might easily be 50, and would make the date more probable, though J. C. French (75a) says the last great nesting in Penn. was 1886 and that these birds were driven out and headed for Canada	J. Davison, Jessop- ville

TABLE I—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Dufferin.....	Amaranth.....		In dozens of places	Hardwood		D. M. Phillips, Laurel
Dufferin.....	Amaranth and Luther, banks of Grand river...		Millions	Balsam and spruce		Thos. Reid, Orangeville
Dufferin.....	Mono, lot 19, 2nd line west.....					Robt. Reid, Camilla
Dufferin.....	Mulmur, Con. E, lot 5-15	1852-55	4 miles square			W. H. Hammell, Beeton
Dufferin.....	Mulmur.....	about 1854	Covered acres			Beeton <i>World</i> (17)
Dundas.....	Matilda, 7 miles north of Iroquois.....		15 or 20 acres	Black alder, tamarack, spruce	Two colonies about 1 mile apart, used year after year	Chas. Rose, Iroquois
Durham.....	Darlington.....	1856-63	Thousands		A roost only	Jas. L. Hughes, Toronto
Durham.....	Along front of county...	1856-66	At first very large, gradually decreasing		These colonies would account for the above roost	W. J. Stevenson, Oshawa
Durham.....	Hope, 10 miles west of Port Hope, near lake shore.....	1827	5 miles square			Diary (unpublished) of Chas. Fothergill. See appendix
Elgin.....	Aldborough - Dunwich, huckleberry marsh between Dutton and West Lorne.....	At its height 1868-70	Nested within 10 mile radius of marsh	Pines about of marsh, also other trees	This is apparently the marsh connected with the Neutral Indian legend	W. A. Edwards (61), also Jno. Froggatt, Dutton
Elgin.....	Yarmouth, 3 miles west of St. Thomas.....			Elms		E. R. White, St. Thomas
Essex.....	South.....	1878 or 1879	A few nests	Hardwood		A. H. Going, Renfrew

TABLE I—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Frontenac....	Kingston, near Kingston.	1898	Small, 20 birds	Beech and maple	This is undoubtedly one of the last nestings of the passenger pigeons known in Ontario	Rockwood <i>Review</i> (22c) Nov., 1898
Frontenac....	Kingston, near Kingston.	1898	Not more than twelve nests	Hardwood	The same colony as above. The quotation from Nash is, "Dr. C. K. Clarke informs me that he found a small colony breeding in eastern Ontario, 1898"	Prof. MacClement, Queen's Univ., also, probably, C.W. Nash, (137)
Frontenac....	Kingston, near Elginburg		200			J. Irvine and J. Ferguson, Elginburg
Glengarry....	Charlottenburg, near Williamstown.....			Wild plums		Hugh Ferguson, Meaford
Grey.....	All over Grey county...	1860-65 (c)	Very numerous	All kinds		John Shaw, Thornbury
Grey.....	Artemesia, 3 miles from lot 35, Con. 4.....	1856	Too large to count			J. Jamieson, Sr., Meaford
Grey.....	Collingwood, Con. 4, side line 7 and 8, 10 miles from Collingwood.....	1874	Of large extent, "a million birds,"			Alex. Dey, Brownsburg, Que.
Grey.....	Collingwood, Con. A, lot 13.....					C.W. Hartman, Clarksburg and Alex. Fleming
Grey.....	Collingwood, Con. 10, lot 9.....					C. W. Hartman and Henry Collins, Clarksburg

TABLE I—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Grey.....	Euphrasia.....		Small scattered colonies			J. D. McArthur, Meaford
Grey.....	Glenelg, near Priceville..		Large and small	Mostly hardwood		S. L. Wright, Uxbridge
Grey.....	Kepple, hills west of Owen Sound.....	1853-54	Great nestings			Robt. Crichton (50)
Grey.....	Kepple.....	1862 65, 69 70, 72 73	Millions	Hardwood, beech, elm, maple		A. W. Manley, D. Rutherford, P. C. Telford, J. P. Telford, Owen Sound
Grey.....	Kepple, Owen Sound to Wiarton.....		Countless numbers		Throughout region from Owen Sound to Wiarton and out to Lake Huron at Sauble Beach	John Snake (Indian), age 107. Cape Croker
Grey.....	Kepple, on county line near corner of Derby and Arran twp. on edge of swamp.....	1871	100 to 200 acres	Cedar, balsam, elm and birch		Jas. Cochrane, Owen Sound
Grey.....	Kepple near Hepworth..	1872 and 73	100 to 200 acres			Name not given
Grey.....	Kepple, 2 miles north of Hepworth.....	About 1878				M. Forhan, Owen Sound
Grey.....	Kepple, Sand Point.....			Hardwood, not evergreens		J. P. Telford, Owen Sound
Grey.....	Kepple, Sarawak and Sydenham, from Griffiths Is. to Vail's Pt....		Many small colonies			J. P. Telford, Owen Sound

TABLE I—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Grey	Proton, near Proton . . .		Large, several thousand			J. Worthy, Toronto
Grey	St. Vincent, Collingwood and Nottawasaga, along shores between Meaford and Collingwood	1877 and previously	Millions			John York, Meaford
Grey	St. Vincent, Brooke, 9th line, lot 26		Thousands	"Low bushes," mostly maple	These bushes are qualified as being 20 or more feet in height. Growing on rocks	Wm. Brown, Meaford
Grey	Sydenham, near Bognor .	About 1834		Hardwood		John Clark, Meaford
Grey	Sydenham		Several acres			W. F. Moore, Dundas
Grey	West shore of Georgian Bay		Covered acres	Maple, beech, and elm		The Misses McLean, Owen Sound
Grey	Valley of the Rocky Saugreen	The '50's	Very large		"A rookery"	Andrew Collins, Toronto
Haldimand . . .	Moulton and Canboro, Moulton Marsh		1500 acres			Name not given
Haliburton . . .	Lutterworth, Miner's Bay	1875	Trees full of nests			D. Gillespie, Miner's Bay
Halton	Esquesing, at Georgetown	The '50's	Very large		Called "a rookery" by Mr. Collins. Apparently means breeding colony	Andrew Collins, Toronto
Halton	Esquesing, Con. 1, lot 28.		Thousands	Spruce, tamarack, pine		H. P. Moore, Acton
Halton	Nassagaweya, near Campbellville	1886	Few pairs			Allan Brooks (33)

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Hastings	Madoc, Eldorado		Variable	Second growth thickets	This is apparently an unusual nesting site	J. H. Covert, Brighton
Hastings	Sidney		Small; scattered nests	Chiefly beech		Jas. Knox, Vancouver
Hastings	Thurlow, in swamps		Covered acres	Pines, cedars and hemlocks		A. C. Garrison, Plainfield
Hastings	North Hastings, Horse Shoe lake	Until 1880	A single nest		It is evident that toward the end pigeons nested more commonly in single pairs	Rev. C. J. Young, Vancouver
Huron	Ashfield, near Kintail . . .	1841				Name not given
Huron	Ashfield, 1¼ miles north of Kintail on east side of Blue Water Highway . .	1870	About 1 mile square	Beech and maple		M. C. Mackenzie, Lucknow
Huron	Ashfield, 6 miles from north end	1870	13 miles by 11 miles		If these dates of 1870 are correct it must have been a "banner" year for pigeons in this locality	Wm. Welsh (187)
Huron	Ashfield, Con. 10-14 . . .	1872-75	500 acres	Hemlock and cedar		M. J. Dalton, Lucknow
Huron	Ashfield, west side		Thousands		A roost only	R. Holmes, Toronto
Huron	Ashfield, swamp			Black ash		J. M. Johnson, Toronto
Huron	Ashfield			Hardwood		E. R. Cameron, Ottawa
Huron	Colborne, near Goderich .	1872	Big nesting		Had been great flight in same season (April) in Niagara dist. (See Migration Flight) This nesting was broken up and birds crossed into Michigan	C. W. Nash to J. R. Dymond, verbally, at Brodie Club, Toronto

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Huron	Colborne, near Goderich .	1870				Mershon (131f)
Huron	Colborne and Morris, Goderich and Wingham		In thousands			C. A. Stone, Toronto
Huron	Stephen, south of Grand Bend	1868 -70		Pines		J. Heywood, London
Huron	Near headwaters of Mait- land river	1866	Covered about two concessions			J. Townson, Toronto
"Huron Tract"	Near Goderich	1829 or 30	Large		Flocks took about 2 hours to leave nesting site in morn- ing	Major Strickland (166)
Kenora—see under Rainy River						
Lambton	Warwick, near Warwick .		"Strong colony"	Hardwood bush		A. M. Thoman, Arkona
Lanark	Near Franktown	1864 or 65	Covered large extent of ground		Consisted of breeding place and roost. Roost said to contain a million birds	Alex. Bell, Toronto
Lennox and Addington	Amherst Island	1853	Scattered nests	Small beech and ironwood		N. Instant, Stella
Lennox and Addington	Camden, 1 mile from Moscow	1867 and 68				M. F. Huffman, Kin- cardine
Lincoln	South	1864	25 birds	Beech	This colony was used for four years	J. M. Beemer, Fen- wick
Lincoln	Niagara, Niagara-on-the Lake		Large numbers			R. Tinning, Toronto
Middlesex	Adelaide		25-50 pairs	Second growth	See Hastings county record in similar growth	Name not given

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Middlesex....	Caradoc, Con. 10, lot 5...				A roost	R. C. Brett, Steenburg
Middlesex....	North Caradoc.....		Large and small			R. R. Ball, Kerwood
Middlesex....	Dorchester.....		Very small, less than 12	Plum and blue beech		C. A. Choate, Calgary
Middlesex....	Ekfrid, near Thames....					W. L. Smith (162)
Middlesex....	London, north section...		Three thousand	Willow and scrub	For one year only	J. Thompson, Byrants-town
Middlesex....	E. Williams, north west of twp. Con. 16, lots 10 and 11.....		Large, 200 acres		In a swamp	Mrs. M. C. Dawson, Parkhill
Muskoka, cf. Parry Sound.	Port Sydney.....	1878	1 nest			A. Kay, Port Sydney
Norfolk.....	Long Point.....	1845				G. Staples
Northumberland.....	Hamilton, north of Baltimore.....					Ahaz Paxton, Eden
Ontario.....	Pickering, few miles north of Brougham.....	About 1860			A "rookery"—probably nested	Bethune (22d)
Ontario.....	Pickering, Frenchman's bay.....		Large		Numbers too large to give definite estimate	R. Tinning, Toronto
Ontario.....	Uxbridge, about 4 miles s. of Uxbridge village..	Before 1876	About 30 acres	Second growth pine		T. W. Cooper, Wainwright, Alta.
Ontario.....	Along front of county...	1856-1866	At first very large, gradually decreasing			W. J. Stevenson, Oshawa

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Oxford.....	Blandford, Blenheim....	1846 or 47	10 miles square	All kinds		J. Cowan, Bright
Oxford.....	Blandford, near Wood- stock.....	1856			"Apparently nested"	J. G. McKelvey, Holmfild, Man.
Oxford.....	Dereham.....	About 1866	Scattered nests			Name not given
Oxford.....	East Zorra, near Hickson		Few nests			J. Wagur, London
Oxford.....	.....		Large	Pines	A roost	F. C. Hood, Toronto
Parry Sound..	Dunchurch, 27 miles n. of Parry Sound.....	1878- 1879	Nested in large numbers			E. H. Kelcey, Loring
Parry Sound and Muskoka			Abundant		"Once abundant in both dis- tricts, breeding,"	J. H. Fleming (67)
Peel.....	Chinguacousy, Brampton		Large numbers			R. Tinning, Toronto
Peel.....	Toronto, Summerville...	About 1868	Large		In a swamp	R. G. Elgie, Toronto
Perth.....	Hibbert, Con. 6, 1 mile west of Centre Road...		Several thousand	Maples		T. J. Murphy, London
Peterborough.	Douro, around Lakefield.	1866- 1876		Beech and maple		J. F. Lillicrap, Lake- field
Prince Edward	Hallowell, near Picton ..		Few nests			Geo. Cork, Toronto
Prince Edward	Hallowell and Sophias- berg.....		Small, 40 or 50		In a big swamp, a roost	R. H. Arthur, Sudbury
Prince Edward	East end of county.....	About 1870	Thousands	Balsam, spruce and hemlock	In thick woods	W. H. Wilcox, Toronto

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Rainy River and Kenora	Lake of the Woods and Rainy Lake District, north of these lakes....		Great numbers		"The birds came in many thousands and great numbers of them bred in the n.e. portion of the province [Man.] through the district north of Lake of the Woods and Rainy Lake [now Ontario] where the cranberry and blueberry are abundant." (Letter, W. J. McLean to Geo. E. Atkinson)	Geo. E. Atkinson (8)
Renfrew.....	McNab, near Arnprior..	1868	20 to 30 individuals			A. Burwash, Arnprior
Simcoe.....	North Essa and north Innisfil, south Vespra and Sunnidale. Between Allandale and Angus....	1859	Covered hundreds of acres	Swamp		Wm. Metcalf, Ravenna
Simcoe.....	Essa, Sunnidale and Nottawasaga. Between Angus and Stayner	1862		Small trees	A roost	C. Hebner, Orillia
Simcoe.....	Nottawasaga (?).....	1865	A heavy nesting		This is described as being "Near Georgian Bay. We were at Angus Station ..."	W. B. Mershon (131e)
Simcoe.....	Innisfil, Harrison's Crossing, between Gilford and Lefroy.....		In thousands		Numerous in this region only every four or five years	H. B. Small (160b)
Simcoe.....	Innisfil, south shore of Kempenfeldt bay.....	1850-1858				Wm. Metcalf, Ravenna
Simcoe.....	Oro (?) "9 miles north-east of Barrie"		Covered about one concession	Beech, maple, oak, birch		J. Townson, Toronto

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Simcoe.....	Sunnidale and Flos near Wasaga Beach. Crow's Corners.....		Several thousand A few nests	Pines	Numbers decreased rapidly during a few years	Mark Robinson, Algonquin Park
Simcoe.....	Vespra.....		Large	Any trees		J. Worthy, Toronto
Simcoe.....	Vespra (?), "north-west of Barrie".....	1865	Large	Cedar swamp		Ahaz Paxton, Eden
Simcoe.....	Valley of the Nottawasaga river.....	The '50's			A "rookery"	A. Collins, Toronto
Simcoe and York.....	Vicinity of the Holland marsh.....		In thousands		"In years gone by"	George Johnson (96)
Sudbury dist..	Gogama and vicinity....		"Quite a number of pigeons nested here"	Crotches of birch	Nested along shores of the lakes	Jas. Miller, Gogama
Thunder Bay.	Nipigon.....	Until 1880				F. S. Wiley, Pt. Arthur
Victoria.....	Bexley, Laxton and Somerville.....	Before 1870	"From 5 to 500"	Evergreen		F. Cooper, Coboconk
Victoria.....	Fenelon.....	About 1827				Major Strickland (166)
Victoria.....	Verulam, Cons. 7, 8, 9, and 10, lots 20-32.....	1869	From hundreds to thousands	Dense wood, high lands and swamps	Roosts and breeding colonies	A. Morrison, Kinnmount
Waterloo.....	Dumfries North around Galt.....	1873 1876				R. T. Nichol, New York
Welland.....	Humberstone, around Port Colborne.....		Small		A few each summer	De W. Carter, Port Colborne

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Welland	Pelham, near Fenwick, across R. Welland		Small colonies	Beech and oak		W. Chambers, Fenwick
Welland	S. Pelham, between Pelham-Thorold town line and 1½ miles west to Mt. Vernon Rd.	1870-1872	400 acres	"Bush"	For a description of these nestings see under Nesting Colonies	G. A. Phillips, Welland
Welland	S. Pelham, further west, area called "Bob Town" now Chantler	1874	1,000 acres countless thousands of nests		Roosted in a huckleberry marsh four miles to the south in tamaracks	G. A. Phillips, Welland
Welland	Stamford, under cliff at Niagara Falls			Oak and tamarack		G. W. Cook, Welland
Welland	Stamford, along Thompson creek		Scattered pairs	Beech		A. W. Reavley, Ridgeway
Welland	Wainfleet				In huckleberry marsh	G. W. Cook, Welland
Wellington	Guelph, near Guelph City in Hatches swamp	1855	A small one	Swamp	Said to be the last nesting near Guelph. After this lone pairs nested here and there along the Speed R.	Dr. Henry Howitt (93)
Wellington	Guelph and Eramosa, along river Speed, from Guelph to Rockwood . .	1835	Guelph and Rockwood are about 8 miles apart		Trees were broken by weight of birds. Wagon loads of squabs were taken away	Dr. Henry Howitt (93)
Wellington	Maryborough		In large numbers	Elms		Chas. Clarke (44)
Wellington	Nichol, Elora	1834	Two or three lots. Trees filled with nests			John Mathison (127)

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
Wellington ...	Peel, Con. 17, lots 4 and 5, 3 miles west of Arthur on a branch of the Cone-stoga river.....		Thousands	Hemlock and cedar		J. T. Harvey, Arthur
Wellington ...	Puslinch.....	1855				R. Passmore, Rockwood
Wentworth ...	Barton, around Hamilton	Early '50's	Large		"A rookery"	A. Collins, Toronto
York.....	Markham, Con. 7, lot 8...		Several hundred	Hemlock and pine	For several years	F. K. Reesor, Markham
York.....	Scarboro, n.e. corner....		500	Pines		J. B. Reesor, Mountjoy
York.....	Scarboro and Markham.				Squabs were fed to the pigs. Only reference we have to this practice in Ontario	W. T. Taylor, Toronto
York.....	Whitchurch, Pine Orchard, 5 miles east of Yonge St. from Mullock's Crs. Con. 5 or 6.	1850	Millions of nests	Pines	For a description of this nesting see under Nesting Colonies.	N. Pearson, Aurora
York.....	Whitchurch, Con. 6.		200 acres	Cedars	In a swamp	D. Clarke, Stouffville
York.....	Whitchurch, Con. 6, lots 12 and 13. Con. 7, lots 14 and 15.....		Thousands	Pines, hemlock	Roosts and breeding colonies. Whether the last two are one and the same is not possible to state, or perhaps Mr. Brodie's and Mr. Pearson's colonies are the same	W. A. Brodie (?), Toronto

TABLE 1—Continued

County	Township and Locality	Date	Size	Kind of Trees	Comment	Source of Information
York.....	York, Toronto waterfront between what are now Bay and Bathurst Sts...					E. A. Bogart, Newmarket
York.....	York, Lambton Park, Toronto.....		Several hundred	Beech		R. S. Tyrrell, Toronto
York.....	York, Con. 2, lot 15, Leaside.....		A few nests		For several years	R. B. Elgie, Toronto
York.....	York, 8 to 10 miles north of Toronto.....			Any high tree		J. Cook, Toronto
York.....	Between Toronto and L. Simcoe.....				Bred "formerly" in this region	J. H. Fleming (69)
E. Ontario....		1898	A small colony		Probably the Kingston colony recorded above	Dr. C. K. Clarke to C. W. Nash (137)
Lake Erie....	Along shores.....	1850-70	Small colonies 12 to 20 birds			H. H. Wright, Aylmer

is, it was not stated whether a "rookery" was a place where the birds nested or was merely a roosting site. But since it must have been either one or the other, their place seemed here rather than under a separate heading. Other records where breeding can only be surmised will be found under the heading of Occurrence.

The remarks referring to the size of the colonies are in practically every case quoted directly from the source of information which is, unless otherwise stated, replies to a questionnaire, or a letter.

Many records are very vague, some having no date, others giving the locality very indefinitely, but they all contribute to the evidence of former prevalence of the species.

Although many items in this table might be discussed at some length, it has seemed inadvisable to do so. Comment is therefore confined to the general aspects of nesting colonies, and a few descriptions of individual sites are given by way of illustration.

Size of Colonies

When we read such accounts of *Ectopistes migratorius* as Audubon (9) and Wilson (191) give, we are inclined to feel that if they are not exaggerated, at least such numbers never existed elsewhere or at a later date. The estimate of actual numbers is very difficult and the comparison of areas covered by nesting colonies or roosts is perhaps all that it is wise to attempt now.

Audubon describes a "place of nightly rendezvous" which he saw about 1813—"I rode through it upward of forty miles, and, crossing it at different parts, found its average breadth to be rather more than three miles." This gives roughly an area of one hundred and twenty square miles. Wilson tells of a nesting place of about the same size also in Kentucky. In Ontario, in Ashfield township, Huron county, there was, about 1870, a nesting colony which covered an area eleven by thirteen miles, or roughly one hundred and forty-three square miles; and about the same time in Elgin county pigeons nested about a great huckleberry marsh for a radius of ten miles. At an earlier date, 1846 or 1847, there was a great nesting in Oxford county which was ten miles square; while still earlier, about 1830, Stickland (166) says:

"I once accompanied the Doctor [Dr. Dunlop] on an exploring expedition through the tract [Huron]. We encamped close to a breeding-place of these birds, when we were kept awake all night by the noise they made. . . .

"Towards morning, the sound of their departure to their feeding-grounds resembled thunder. For nearly two hours there was one incessant roar, as flock after flock took its departure eastward. The

ground under the trees was whitened with their excrement, and strewn with broken branches of trees."

I realize that here are compared, in one instance, nesting colonies with a roost, but when a few facts are taken into consideration the comparison does not seem unfair. From Audubon's text it would seem that the place he describes was a roost used at a time other than during the breeding season and would therefore in all probability contain recruits from more than one nesting colony; nor does he anywhere else mention a breeding colony which was larger than this roost. In telling of the arrival of birds he says they came from sundown to midnight, a period of probably about five hours, or perhaps less. The birds from the Huron Tract colony of Strickland's description took two hours to leave in the morning and this might have been only half the colony, either males or females. See section on "Daily Flights." It would thus seem that some of our Ontario nestings were quite comparable in size with those of an earlier date farther south.

Decline in Size

It is difficult to trace the decline in size of breeding colonies, for a man's estimate of size or numbers is always relative to his own knowledge; and the fact that so few references have definite dates makes it still more complicated. For instance, someone who saw what he considered a very large colony in 1878 might have thought it fairly small had he seen larger ones in 1870. That there was a general decline in size seems apparent from the information received. Many men now living say that the flocks and colonies that they have seen were smaller than those reported by their fathers—and the fact that the marketing of pigeons was not considered a profitable business in Ontario for many years prior to their disappearance substantiates the theory.

Dates for Ontario Nestings

Dates in the table seem to show that there were very few nestings of any importance in the settled districts of Ontario after 1875, although pigeons still nested in large numbers in Parry Sound District in 1878-79 and were still "extraordinarily abundant" in northern Michigan at this time; the last nestings of any importance in the latter region being in 1880 and 1881 (15c). There is only one large nesting in Ontario which may have been contemporaneous with these as far as we know—that is one in Dufferin county, Amaranth township, the date for which was given in 1929 as "forty-five years ago," this being perhaps a rough estimate.

The majority of dates for nestings in Ontario are for the years between 1860 and 1875, and of course the question arises—were these unusual pigeon years or is it merely that there are very few men living to-day whose memories go back farther than this? The latter assumption seems the more probable since it will be shown in the section on "Variation in Numbers," that "pigeon years" were due more to local abundance than to actual fluctuation in numbers of the species as a whole. After 1875 the birds were not only decreasing rapidly but were also being driven to nest farther from the settled parts of the country.

Distribution of Nesting Pigeons

After reading many old accounts of passenger pigeons it seemed apparent that some writers thought that each vast flock they saw contained all the pigeons in America and that there would therefore be only one great nesting in the country each season. There is an obvious way of disproving this, which is by tracing nestings of a certain date through different localities. Take for instance the year 1869; in this year "the birds were in Canada, Michigan, Indiana and Wisconsin all at the same time" (131f), and this is not mere surmise, for Mr. Osborn, whose letter is quoted, was a professional "pigeoner" having information based on commercial facts; then taking this same year in Ontario we find that nestings took place in Bruce, Grey and Huron, Elgin and Victoria counties—and no doubt in other localities from which nestings were reported for "about 1870."

In 1870 there was an enormous nesting in Potter and McKean counties in Pennsylvania, this site being one and a half to two miles wide and about forty miles long (72a); while in Ontario they nested plentifully in Grey, Huron (in three or more places) and Welland counties. Again in 1878, the year of great nesting at Petosky, Michigan, described by Mershon (131) and Barrows (15), colonies were formed at two other localities in Michigan and this same year they are said to have been breeding commonly in Parry Sound District near Dunchurch. So it seems that the birds were quite generally distributed, and not only, as Alexander Wilson says (191b), did "stragglers from these immense armies settle in almost every part of the country," but great nestings took place simultaneously in comparatively close proximity.

Distribution of Nesting Colonies in Ontario

From an examination of the maps it is apparent that the nesting colonies of which we have records were largely concentrated in a semi-circle from the Bruce Peninsula through the Toronto region to the Niagara district.

The concentration in the Bruce Peninsula is perhaps easily explained. Here, apparently, physical conditions were ideal. Even to-day the country is well wooded with beech so that in the pigeons' time it must have been magnificently so. This in conjunction with much swamp land gave the birds their two most sought-after commodities—mast and mud. This latter idiosyncrasy will be discussed more fully in the section covering food.

In Simcoe county, according to Mr. John Townson, there was formerly a well known beechwood ridge between Barrie and Orillia where pigeons nested plentifully, and to which his father went on pigeon hunting expeditions.

North York also was a suitable nesting locality with large pine areas bordered to the south with oak on the old "Oak Ridges," while the Holland marsh region was as well a favourite with the birds. In the immediate vicinity of Toronto, none of the colonies was very large and it would seem that the number of small ones recorded is due to the greater population of the district, which naturally contains more people who remember the pigeons. It is also a question as to whether there was actual concentration of nesting colonies in the Niagara Peninsula, or whether it is simply that Niagara, being an old settlement with well populated outlying districts, produced more information per square mile than more thinly peopled regions. I think in this case both facts may be true for evidently the Welland swamps were attractive roosting and feeding grounds, and were conjoined with favourable hardwood tracts, containing much beech.

Northern nesting records will be discussed more fully under details of Ontario distribution.

Choice of Nesting Sites

Judging from information obtained from questionnaires, and from the literature any species of tree of suitable size was used in a suitable locality. The locality was perhaps determined by food supply and the trees themselves were probably of secondary consideration. A preference for beech mast would lead to an apparent preference for beech trees as building sites, but judging from the great variety of trees in which pigeons' nests were found the seeming preference was really more a matter of convenience.

It has been suggested that the tendency to nest in swamps and scrubby growth on rocky country was a late phase, a retreat to the only available land left to the birds, land unsuitable for cultivation or timber cutting. This may have been the case to a certain extent, as such situations would undoubtedly be the last to be cleared, but even in the days

of the immense hardwood tracts, swamps were not avoided. In the stupendous sweep of the great nestings all types of country were engulfed. It is said of one of the great Michigan colonies (30a): "The birds began building when the snow was twelve inches deep in the woods, although the fields were bare at the time. So rapidly did the colony extend its boundaries, that it soon passed literally over and around the place where he was netting [Mr. S. S. Stevens, professional pigeon], although, when he began this point was several miles from the nearest nest. Nestings usually start in deciduous woods, but during their progress the pigeons do not skip any kind of trees they encounter. The Petosky nesting extended 8 miles through hardwood timber, then crossed a river-bottom wooded with arbor-vitae, and thence stretched through white pine woods about 20 miles. For the entire distance of 28 miles every tree of any size had more or fewer nests, and many trees were filled with them. None were lower than about 15 feet from the ground."

On looking at the table of nesting colonies it will be seen that, as usual, little can be proved conclusively in this respect with regard to Ontario. With the most aggravating regularity where swamp land is indicated as a nesting site, or might be implied from the type of tree used, no date is given. There is one reference however which indicates that swamp land was sometimes chosen in preference to other sites. Mr. Wm. Metcalf of Ravenna says that in the year 1859 they nested in a large swamp between Allandale and Angus, the colony covering hundreds of acres. He states: ". . .this is damp land but on every side for miles was thick pinery and no end to bush in every direction."

Another statement from Victoria county says that in 1869 pigeons nested in "dense woods, highlands and swamps." This is a fairly late date yet there seems to have been ample hardwood left for breeding colonies so that swamps were apparently used quite as much from choice as from force of circumstance.

Quite incidently, the way in which Mr. Metcalf's date of 1859 was definitely established is interesting. He remembered it as "1858-9 or thereabouts—just before 1860" and placed it thus because his brother came of age that year and also because of a frost which occurred in late May or early June which killed all the newly sprouted grain, and necessitated its being resown. On writing to the Toronto Meteorological office we received the following information: "In 1859 May ended mild but on June 5th temperature fell to 32.2 Fahr. This might well be the date since grain frozen so late would likely be resown as he says. The temperature at Allandale during such a frost would be lower than at Toronto."

Use of Nesting Site for Several Years

There is ample evidence that nesting sites were used for more than one year, which seems rather surprising considering the enormous amount of food that the large flocks must have consumed. They were not, however, dependent on any one source of food, and should a favourite such as beech mast fail or be exhausted, the lack could be supplied by elm seeds, acorns or berries of various kinds; and their power of flight enabled them to seek these out at great distances.

On consulting the table it will be seen that there are seven localities where nesting occurred for several years—Dufferin county, Mulmur township, 1852-55; Elgin county, Aldborough and Dunwich townships "at its height" from 1868-70; Grey county, Kepple township, 1853 and 1854, and also in Kepple township in 1862-65, 1869, 1870, 1872 and 1873 (although these might have been in different parts of the township in different years); Lincoln county, Louth township, used for 4 years; Welland county, South Pelham township, 1870-72.

Roosts also were evidently used for several years, one in Durham county, Darlington township from 1856-66, and in Forest and Stream in 1880 (116) there is mention made of a roost in Scott county, Indiana, which was used for seventy-five years.

Use of Nesting Sites as Roosts

It has already been pointed out that roosts, to which the birds repaired at night, were quite often to be found near areas in which nesting took place. Our information is too scant and vague to allow us to form an opinion as to whether such roosts always occurred near nesting sites, but Whitman's (39c) experience with captive birds, would suggest that such was their invariable rule. He says that paired passenger pigeons, until the eggs were laid, commonly roosted close together, but when the egg appeared the male at once showed a desire to roost away from the female, going as far away from her as the cage would allow.

When nesting had been finished the nesting sites were often used by old and young for night roosting, according to information obtained from our enquiries.

General Descriptions

Much has been written describing the great nesting colonies in the works of Wilson (191), Audubon (9), Mershon (131) and Barrows (15), and even in Fenimore Cooper's "The Pioneers" (48), but it seems

appropriate to quote here from one or two Ontario accounts, although it will be in some respects mere repetition.

Mr. Geo. A. Phillips of Welland writes: "In South Pelham between the Thorold town line and $1\frac{1}{2}$ miles west to the Mt. Vernon road there was a block of over four hundred acres of solid bush made up of pine, white oak, beech, hard and soft maple with ash, elm and basswood, on level land. Here I saw a great many nests. One did not have to hunt far for them but just keep glancing up in the tree tops and see them by the dozens. Most of them were built low down—from eight to twelve feet would be the predominating height though some others were 25 or 30 feet high. . . . Still west of this block of timber was a larger tract of wood containing perhaps a thousand acres, and on which pine, chestnut, white oak and beech predominated. This section was known as a "Bob Town" and a small part of it still goes by the same name, though the greater part of it is now called Chantler. In this locality there were countless numbers of nests most of them built low down as before mentioned. The pigeons generally arrived in the early part of May, though they are said to have appeared some years in early April. They feasted on the beech nuts, acorns and chestnuts, scratching the leaves off, and there would be immense numbers of birds which, when suddenly alarmed would rise with a roar like a passing train. Then along towards sunset they would flock south to the great huckleberry marsh about four miles distant, to roost over night in the tamaracks, and return each morning to their favourite feeding grounds."

Mr. N. Pearson of Aurora says: "In a neighbourhood five or six miles east of Yonge Street straight from Mulock's Corners is a place called Pine Orchard [York county] properly called as there is, or was, a grove of pines of from ten to an hundred feet high with close branches and very dense, suitable in every way for nest building and the natural instinct of the pigeons preempted this place for a Rookery and to say that there were millions of nests there would be mere assertion. But no matter how many there were the facts would not account for the myriads of birds found in the country about. . . .

"In the season Pine Orchard was inundated with people from the country about. Waggon loads of Farmers with their sons from miles about came during the daytime and at night with lanterns and torches and slaughtered with wholesale vigor. Caught the old birds and wrung their necks and carried off the squabs in bags by the waggon load."

Colonies of pigeons in Elgin county according to Mr. W. A. Edwards of Wardsville were "so large that they and their offspring like a storm cloud sometimes shut out the sunshine."

NESTING HABITS

The Nest

The type of construction of passenger pigeons' nests is already well known—a shallow platform of small twigs, resembling that of the mourning dove. Many nests were built in one tree, often so many that branches broke with the increasing weight of the squabs. They were usually placed near the trunk—the logical position for such a frail nest—and in uncrowded localities, chiefly in the lower branches.

Number of Eggs

The question of the number of eggs laid by this species has been discussed for many years, and still there is no agreement. In the mass of information which we have received there is nothing which could be quoted with absolute authority, although the majority of answers stated that two eggs was the usual number. Of sixty-eight replies to this section of the questionnaire thirty-nine said two eggs, ten said one, and nineteen said two or more. Mr. John Difenderfer of Three Rivers, Michigan, states in his very full and intelligent response to our questions that two was the usual number and that when more than this were in one nest it was due to more than one female laying there. This suggestion is supported by Barrows (15a): "Nevertheless, most authorities believe that but one egg was laid by each bird, the cases in which two eggs were found in a nest being explained on the supposition that two females used the same nest." It is further strengthened by the statement of Forbush (72b) that a communal spirit was shown amongst these birds in the feeding of a deserted squab by several females. To illustrate this he quotes an instance of a man who shot, one after another, six females which came to feed one squab.

Incubation

There has been considerable discussion as to the time required to hatch the eggs. Whitman says (39b): "The shortest incubation period that I have known anything about [in various species of pigeons] is that of the wild passenger-pigeon, which is only $12\frac{1}{2}$ days." But it has been variously given (Forbush, 72; Barrows, 15a; Macoun, 118) ranging from thirteen to twenty-four days. The period was very likely influenced by weather conditions which would vary with the birds' irregular spring arrival. In our reports the estimate is from two to three weeks with the majority in favour of the former period. Again there is divergence of opinion with regard to the period spent by the young in the nest after hatching, but it seems fairly certain that it must have been about two weeks.

Brooding

The duties of brooding and feeding the young were evidently shared by the male and female, apparently with great regularity; this being proved by the daily flights to the feeding grounds when at certain hours a flock would consist entirely of females while at other hours it would contain male birds only. This practice is in accordance with the habits of mourning doves and other species of pigeons. (See section on Daily Flights).

Number of Broods

There is evidence of great variability as to the number of broods each season. Apparently in some seasons and certain localities only one was raised, while in others, evidence points to more than one, the number no doubt being governed by the weather, the food supply and the subsequent condition of the birds. In describing such variability in other species, Elton (63c) says: ". . . but there are a great many cases known in which the weather affects mating or breeding, or in which climate or food supply vary the number of young produced in a brood, or the number of broods born in a year. For instance, the short-eared owl (*Asio flammeus flammeus*) may have twice as many young in a brood and twice as many broods as usual, during a vole plague, when its food is extremely plentiful. But these variations in the reproductive capacity are small compared to the limits which are imposed by the constitution of the animals."

We do not know definitely how many eggs these pigeons were capable of laying in a wild state. Some in a captive flock of Mr. David Whitaker's, of Milwaukee, laid seven and eight in a season, but this was evidently abnormal and the average was three or four (56). As Barrows (15a) points out, the best proof that more than one brood was raised lies in the fact of large nestings lasting for so many weeks that the period must have covered more than one brood, and at least two.

In this connection Whitman (39a) made an interesting observation concerning his captives. He said that his birds, having reared one squab and being ready to lay a second egg, showed the greatest desire to build another nest in a different site. They would try ceaselessly to get out of the cage. To quote: "It is remarkable how strong is the instinct *to place the new nest in a new locality.*" (Italics are Whitman's.) He says the same instinct is present in other species of pigeons and thinks that it is based on the desire for a clean nest. If this was a fixed habit in free birds and the new site was in an entirely new region, and not just on the outskirts of the old colony, it would account for some of the

irregularity of spring appearance. Late arrivals might quite probably have already nested elsewhere. Indeed Richardson (168) says: "The Pigeons came to the breeding place [in Kentucky, as described by Wilson] on the 10th of April, and left it with their young before the 25th of May. It is after this period that they resort to the fur-countries³ to breed; and it is probable that several broods are raised in a season at different places." This habit might also account for the fact that a nesting site grew in size during the season. New nests might be added by new arrivals from other regions, and new nests might be built on the outskirts of the colony by those birds that had already nested there.

In late years molestation was an undoubted cause of desertion of nestings after the raising of one brood. But under normal conditions it was probably a matter of choice whether a colony was abandoned and a new site chosen for a second brood.

OCCURRENCE

Discussion of Occurrence

Records of occurrence (Table 2) were taken very largely from books of travel, which accounts for their brief and casual nature. They are with few exceptions merely notes made by men passing through the country, and in most cases by writers whose primary interest was by no means ornithology. Because of this the references are usually brief and often of little definite scientific value in that they contain few particulars such as exact date, or exact locality.

One record, that of occurrence of pigeons in the "Nipigon Country," has not been marked on Map 3 (p. 58) for the following reason. In the article (126a) containing the reference this region is described: "The Nipigon department . . . lies between the 49th and 57th degrees north latitude and is bounded: on the south, by Lake Superior, on the south-west and west, by the north-west road from Lake Superior to the lower end of Lake Ouinipique; on the north-west and north, by Hayes river and part of Hudson Bay; and on the south-east by Hudson Bay." This is an enormous tract of land including the present Districts of Kenora, Kenora (Patricia portion), Thunder Bay and Cochrane, and even to-day much of it is unexplored. Duncan Cameron, the author of the article, was a clerk of the North West Company, and no doubt travelled widely through the region in pursuit of his duties, but in spite of this I feel it would not be justifiable to mark the entire tract as having been frequented by wild pigeons.

³Richardson states that the fur-countries comprised "the whole country north of the forty-eight parallel of latitude." In Ontario this is, roughly, north of a line from Port Arthur to Lake Abitibi.

TABLE 2—OCCURRENCE OTHER THAN NESTING RECORDS

Locality	Date	Reference	Source
Algoma District.....		Occurred in great numbers throughout the district	Questionnaire
Bruce Mines.....	Before 1873	Formerly found in great numbers at Bruce Mines prior to 1873	See footnote
Echo Bay.....	1887	Seen at Echo Bay and up Echo River	
Near Michipicoten.....	About 1882	Small flock seen feeding on pin-cherries between Wawa Lake and Michipicoten	
Sault Ste. Marie.....	1762	"During the summer . . . pigeons were in great plenty"	Alexander Henry, (89a)
Sault Ste. Marie.....		Occurred at the Sault	
Cochrane District Hancock Rapids.....	Probably between 1869-1878	"The furthest north that I remember seeing pigeons was on the islands at Hancock Rapids, but they were not so numerous as further up the river to the south. Hancock Rapids is at head of tide water but I never remember seeing any along the shores of James Bay"	Joe Moore, Wawaitin Falls
Moose Factory.....	1772	"Abounds at Moose Factory and further inland to the south"	Forster, (74)
Moose Factory.....	1860	"Specimen obtained August 16, 1860, by C. Drexler at Moose Factory"	Packard, (141)
Cochrane District	Before 1890	"Pigeons, unaccountably to me, are very scarce in the territory"	E. B. Borron, (28)
Dundas County West of top of Long Sault	First week in Sept., 1796	"As we passed along we had excellent diversion in shooting pigeons, several large flights of which we met with in the woods"	Isaac Weld, Jr., (185)
Dundas County	1861	Listed without comment	James Croil, (51)

Items for which no source is given are taken from casual information in letters or questionnaires.

TABLE 2—Continued

Locality	Date	Reference	Source
Dundas County		"Were plentiful all over Dundas county from the river St. Lawrence north to the city of Ottawa"	
Frontenac Lobra Lake north of Kingston.....	1842	Occurrence noted	John Robert Godley, (78)
Frontenac & Renfrew Co...	April 18 1878	"J. G. S. says . . . great pigeon news comes from the line of the Kingston & Pembroke R.R., but this is not new, for there were always plenty of pigeons in that direction in the spring"	"Royal" (154)
Georgian Bay	About 1863	Shores frequented by pigeons	J. C. Hamilton, (85)
Glengarry County Charlottenburg tp.....		Occurred near Williamstown	
Grenville County.		"Pigeons in abundance" during early settlement	Mrs. Alex Burritt, (34)
Haliburton County Dysart township.....		Occurred four miles north of Haliburton town	
Haliburton County Northern part.....		Occurred "60 miles north of Coboconk", which would be about the Lake of Bays region	
Halton County Nelson township.....		Used to gather at salt lick in Bridgeman's bush, near Zimmerman	
Hastings County		Occurred in north Hastings	
Limerick township.....		Occurred 30 miles north of Madoc	
Marmora township.....		Occurred at Marmora	J. Townson, Toronto

Items for which no source is given are taken from casual information in letters or questionnaires.

TABLE 2—Continued

Locality	Date	Reference	Source
Kenora Patricia Portion Fort Severn.....	1772	Said to be scarce so far north	Forster, (74)
Patricia Portion.....	1873	Seen flying north, 300 miles north of Lake Superior	J. Diefenderfer, Three Rivers, Michigan. See p. 60
Lake of the Woods Garden Island (U.S.) ...	Aug. 24 1857	Flocks flying about Garden Island	Hind, (90)
Northwest Angle.....	July 30 1871	"In the open parts of the country many kinds of wild fruit grew luxuriantly, such as strawberries, raspberries, black and red currants, and so forth, and many flocks of wild pigeons . . . were sitting on the branches of different trees by the roadside"	John Macoun, (120)
Lake St. Clair	1876	"Wild pigeons are plentiful along the shores of Lake St. Clair"	Game Bag and Gun Column, (76)
Lakes Superior and Huron	1860	Small flocks and single birds around both lakes during the whole summer	Robert Bell, (19)
Lake Superior, the Sault to Fort William		Included in list of birds of region In general description: "Occasionally you come upon a silent, solitary pigeon sitting on a dead bough"	L. Agassiz, (2b and c)
Lincoln County Niagara township St. David's.....		"Used to throng here in millions"	W. W. B., (10)
Manitoulin Island	1866	Noted as very numerous all through the interior of the island	H. G. Vennor, (182)
Manitoulin Island	'70's	Occurred there	Thomas Rowe, Meaford

TABLE 2—Continued

Locality	Date	Reference	Source
Muskoka District Gravenhurst,	April 3, 1875	"Wild pigeons have not made their appearance yet; expect them in another week or so"	Joseph Scott, (155)
Huntsville,		Were numerous and destructive to crops	
Niagara District	1866	"Still resorts in such quantities that Audubon's graphic description of the flights of wild pigeons ceases to appear overdrawn"	H. B. Small, (160c)
"Nipigon country"	Previous to 1804	"Some years there are many pigeons which are very fat and palatable when they feed on berries . . ." (See also page 51)	L. R. Masson, (126b)
Norfolk County Long Point,	1822	"Immense flocks of the passenger or wild pigeon frequent this and other parts of Upper Canada during the spring and autumn"	John Howison, (92)
Northumberland County Rice Lake,	1882	"Abound in the forest surrounding the lake"	R. S. H., (84)
Parry Sound District Burks Falls,		Occurred	
Peterborough County Otonabee township, Peterborough,	April 6 1833	Arrived in the woods	Thos. Need, (138a)
Otonabee township, Peterborough,	Fall 1871	"One evening . . . I saw flock after flock of wild pigeons resting on the branches of a dead pine near the track (Mud Lake R.R.) They stayed only a short time and made room for others . . ."	"Snipe," (164)
Perth County Elma tp., lot 31, Con. 8.	1869	Occurred. Female shot that year	See list of Museum specimens

Items for which no source is given are taken from casual information in letters or questionnaires.

TABLE 2—Continued

Locality	Date	Reference	Source
Prescott County Caledonia township.....	About 1864	Occurred commonly and were destructive to crops. See reference to Caledonia Springs, page 96	
Renfrew County Pembroke district.....	Prior to 1876	Occurred in this district	S. W. Ray, Port Arthur
Sudbury District Gogama.....		"Were found here in hundreds of thousands"	James Miller. See also under nesting records
Mattagami.....	Before 1871	"Saw many of these birds when living in Mattagami, Ontario, before 1871 . . . The birds always came down from the north around the blueberry season, they flew further south in large flocks"	Wm. Moore, Moose Factory
South end of Lake Kenogamissi	1892	One seen in late July	S. R. Clarke, (45)
Thunder Bay District Albany River, Martin's Falls.....	August About 1840	" . . . Barnston, writing in 1840 [<i>Edin. New Phil. Journ.</i> XXX, p. 255, 1840] states that the migratory pigeon was frequently seen during August . . . but disappeared about September 10"	E. A. Preble, (148)
Fort William.....	July 21 1848	"Wild pigeons . . . about the fort"	L. Agassiz, (2a)
Ile de Ponchartrain (Slate Island).....	May 1771	Pigeons were seen early in May, 1771	Alexander Henry, (89b)
Lake Nipigon, Big Flat Rock Portage (Black Sturgeon Lake).....	About 1879	A few pigeons noted eating blueberries on July 16	C. C. H., (83)

Items for which no source is given are taken from casual information in letters or questionnaires.

TABLE 2—Continued

Locality	Date	Reference	Source
Long Lake region.....	About 1883	"Both plover and pigeon are very scarce on the height of land." "... At the Narrows we saw the first wild pigeon met with on this trip. I cannot account for their scarcity on the height of land at this season, or understand where the great multitudes of these birds that are frequently seen going north stop to breed. It is certainly not between the Great Lakes and James Bay, or I should have seen many more of them"	E. B. Borron, (27a and 27b)
Nipigon River.....	August 1879	Found almost daily in August, 1879	J. H. Bissell, (23)
Timiskaming Liskeard.....		Occurred in sufficient numbers to be destructive to crops	
Victoria County Bexley tp. near Coboconk	Sept. 1877	Young birds shot in September on the banks of the Gull River	John Townson, Nature Corr., Toronto <i>Globe</i>
Victoria County	June 1835	Immense flocks seen	John Langton, (107)
Verulam township.....	April 1 1834	"Pigeons have returned in large flocks to the forests"	Thos. Need, (138b)
Verulam township.....	1869	Common about Bobcaygeon in 1869. Reported to have been much more so ten years before	
Wellington County Nichol tp., Fergus.....	June 1835	"Occurred in large numbers in the district"	A. W. Wright, (196)
Wellington		"Once abundant, now extinct"	A. B. Klugh, (102)

Items for which no source is given are taken from casual information in letters or questionnaires.

MAP 3—Showing localities and areas where passenger pigeons occurred but are not definitely known to have nested. The large dots indicate definite localities where the birds are reported to have occurred. Smaller dotted areas show regions throughout which they occurred.

DISCUSSION OF ONTARIO DISTRIBUTION

From an examination of the maps showing nesting and occurrence it would appear that the majority of nesting records are in the south of the province, and the occurrence records are towards the north. The supposition from this is that pigeons confined their nesting to southern Ontario and appeared only as late summer visitants in the northern regions, but that such was *not* the case will be shown in the discussion which follows. It seems more probable that, as already indicated with regard to the apparent local concentration of nesting in southern Ontario, the scarcity of nesting records from the north is due more to a lack of observers than to a scarcity of pigeons. There are many facts which prove the possibility of common occurrence and nesting of pigeons in the northern area. We know from an article of Fleming's (67) that the species nested throughout the Parry Sound District. This carries nesting above the Transition Zone into the Canadian Zone, and natural conditions which prevail in Parry Sound continue westward to the east shore of Lake Superior and are then found again westward of the Lake in south Thunder Bay and through Rainy River and Kenora to Lake Winnipeg. We know from Atkinson (8) that pigeons bred in this western Lake of the Woods region, and there seems no reason to doubt that they did so between this and Parry Sound in the section designated. The number of summer occurrence records from Algoma would substantiate such a supposition, for it seems probable that passenger pigeons completed their physiological development in one season and in consequence there would not be flocks of immature birds to wander freely and widely the next year, making a large, erratic summer population where no breeding had taken place, as there are in some species; and even though they were wanderers after the breeding season was over there seems no reason for more southern nesting birds to travel so far north.

There are two records of pigeons flying into this region in spring; one is from a questionnaire from Manitoulin Island, stating that they used to fly north over the Island in June, evidently going beyond it to nest; while Borron says (27b), as quoted in the table, that birds flew into the region north and east of Lake Superior, although he failed to find their nests.

Natural conditions along the shore of Lake Superior lying within Thunder Bay district are more northerly in character than to the east and west, the northward curve of the shore and the greater altitude being the causes, and yet there is a record of pigeons being common and breeding until about 1880 at Nipigon, and of them being seen on Slate Island in early May (89b). We know, too, from correspondents that they

occurred in thousands in the region of Lakes Kenogamissi and Mattagami, Sudbury District, and nested at Gogama to the southwest of these lakes; were destructive to crops at Liskeard, Timiskaming District, and nested in the region east of Lake Timiskaming in Quebec. This last record is from an account of wild pigeons sent by Monsieur Gauthier, Mayor of Taschereau, Quebec. In view of these facts it seems justifiable to say that all of Ontario south of the height of land dividing the Hudson Bay drainage system from that of the Great Lakes was included in the breeding range of the passenger pigeon.

North of the height of land, well authenticated records tell of pigeons occurring and breeding. Conditions in the clay belt would be favourable to them, and although so much farther north than the region just discussed, it is well known that climatic conditions tend to ameliorate somewhat in a northward direction due to the influence of the coastal plain. It is evident from the general distribution of *Ectopistes* in America that this region lies within its range. There are various records of occurrence both east and west of Ontario that follow the general northwest and southeast slope of the province. In addition to records already given in the earlier part of this article Lemoine says (112) pigeons were common in the province of Quebec, indeed he says: "The northern mountain ranges were infested with them," and he records four from the Lake St. John region in 1889. West of Ontario Bell (20) saw them on the upper Nelson river in September, 1878.

There are few definite records from this region of Ontario, but what there are, are significant. Nesting records are: three from Moose Factory, one from the Abitibi river, and one from the Mattagami, and added to these a record from a closely adjoining part of Quebec, the east end of Lake Abitibi. Occurrence records are from Moose Factory, the Albany, at Martin's Falls, the Severn and the region between these two rivers. Here again, I think it is significant that six out of eleven Northern Ontario records are from Moose, the largest centre of civilization in the region.

The record for the section north of the Albany is possibly of little scientific value, but is included for its interest. Mr. Difenderfer, whose report it is, gave a very intelligent account of pigeons in Michigan and also the facts presented in the table. He said he was "on a trip" when he saw the birds as stated. I wrote to him for confirmatory details, but could get no reply.

There are several facts worth noting concerning the breeding records from the Abitibi and Mattagami rivers. The information was supplied by Mr. Joe Moore, a former mail carrier between the Abitibi Post and Moose Factory, whose reliability is vouched for not only by the general

tone of his information, but also by Mr. La Prairie of Canadian Industries Limited, at Timmins. Mr. Moore says that the birds nested along the Abitibi Canyon and farther to the north, and at Smoky Falls on the Mattagami, in large numbers and for several years (see Table 1).

According to a Forestry Department (97) map of the region these records are just within the northern edge of the clay belt, the Abitibi nesting area stretching some miles farther north, and both localities are apparently quite well wooded with conifers and mixed hardwood; the ridges mentioned by Mr. Moore being, in 1923 when the map was made, still partly covered with "virgin forest". (Mr. Moore says the nestings extended below the Abitibi Canyon for about sixteen miles to "Altar Falls". No such place has been found on any map, but the Forestry map shows at about this distance from the Canyon "Otter Rapids", which may be the same. "Altar" and "Otter" are not unlike when carelessly pronounced.)

It might also be noted that these two nestings are immediately within the northern limits of the white elm, as is the nesting record for the region at the east end of Lake Abitibi in Quebec. This is perhaps significant in view of the fact that the seeds of the elm were frequently eaten by pigeons.

At Moose Factory, the Forestry map shows an isolated patch of coniferous forest, where no doubt the birds nested.

The breeding records are very brief and to augment them Hutchin's MSS, "Observations on Hudson's Bay, 1782," as given in Thompson's *Birds of Manitoba* (95) and (172), is quoted at length: "The first species I shall take notice of is one I received at Severn [see footnote 2, page 00] in the year 1771, and, having sent it home preserved to Mr. Pennant, he informed me that it was the migratoria species. They are very numerous inland and visit our settlement to the southward in summer. They are plenty about Moose Fort and inland, where they breed, choosing an arboreous situation. The gentlemen number them amongst the many delicacies Hudson's Bay affords our tables. 'Tis a hardy bird, continuing with them till December. In summer their food is berries, and when these are covered with snow they eat the juniper buds. They lay two eggs and are gregarious. . . . About twenty years ago these pigeons migrated up as high as York Fort, but continued only two days."

Throughout practically the whole great region under discussion there should have been no problem of food supply. The majority of the region lies beyond the northern limits of beech, oak and maple, the pigeons' favourites in the south, but there would be other bud and seed producing species, many of which extend to James Bay. Amongst them are the white elm already mentioned, canoe birch, spruce and the ubiquitous

pin cherry (*Prunus pennsylvanicus*). The last named species was evidently eaten by *Ectopistes* since it is called pigeon cherry (see page 101).

Even if these various trees were more or less sporadic in their distribution, there would be great quantities of different kinds of berries to supplement them. According to all travellers' reports gooseberries, currants, blueberries of several kinds, cranberries and crowberries (*Empetrum nigrum*) are immensely plentiful, each in its season, throughout Northern Ontario.

All things considered then—definite records of breeding and occurrence, suitability of habitat, abundance of food and wide ranging tendency of passenger pigeons—it seems safe to assume that they nested in many localities in northern Ontario, north to Moose Factory and occurred widely throughout the region, irregularly in the most northerly parts.

PLACE NAMES

Another way of increasing information on the distribution of the species is by noting places—lakes, rivers, etc., bearing the name Pigeon, or its Indian equivalent. There are no doubt many small lakes and rivers with this name which are not indicated on any map, but several have been listed and a few are of considerable interest.

The one of most interest to Toronto is that of one of its suburbs, "Mimico," which is from an Indian word meaning a place where pigeons congregate.

Omeme is also of Indian origin, the Pottawattomie for pigeon being O-me-me-wog, Chippewa and Cree for pigeon being Omimi. A list of Ontario names follows:

Mimico, York county.

Omeme, Victoria county south, on Pigeon river.

Omemea island, Parry Sound District.

Pigeon bay, Essex county.

Pigeon island, west end of the Thousand Islands.

Pigeon lake, Haliburton county, west of Gull lake.

Pigeon lake, Peterborough county, 10 miles north of Peterborough.

Pigeon lake, Sudbury District.

Pigeon lake, Thunder Bay District, on the Ombabika river.

Pigeon rapid, Cochrane District, Mattagami river north of Lake Kenogamissee.

Pigeon river, Victoria county, etc., flowing into Pigeon lake, Peterborough county.

There are a few other places with this name scattered across Canada, but those particularly pertinent to this article are three situated in

Manitoba. They are Pigeon lake, Pigeon point and Pigeon river on the west shore of Lake Winnipeg north of latitude 52° and might almost be said to constitute another northern occurrence record.

MIGRATION FLIGHTS

"They clouded the sun in their flight and shadow after shadow passed on the fields," said one of our correspondents.

The great migration flights of the passenger pigeon were undoubtedly its chief claim to fame. They were spectacular to a degree. In the early days when they came men dropped their work in field or woods, women left their indoor tasks and all stood agaze while the mighty armies rushed thundering overhead; and even later when our cities were growing up and we were becoming more civilized, flights of pigeons were considered a great event. One of our correspondents says they came next in excitement to the Fenian Raids!

Much has been written of these great migrations, more than of any other aspect of the species. Wilson (191) and Audubon (9) devote pages to descriptions of the amazing flights they witnessed in the south and these are so well known that they are not quoted here. There are given instead one or two excerpts from other sources, which will be of more local interest.

Two of the best descriptions of flights to be found in the early literature relating to Canada have already been given—those of Weld (185) and King (101)—but there are still others. Strickland (166) says:

"Persons unacquainted with the country and the gregarious habits of this lovely bird are apt to doubt the accounts they have heard or read respecting their vast numbers; since my return to England I have repeatedly been questioned upon the subject. In answer to these queries, I can only say that, in some parts of the province, early in the spring and directly after wheat-harvest, their numbers are incredible. Some days they commence flying as soon as it is light in the morning, and continue, flock after flock, till sun-down. To calculate the sum total of birds passing even on one day, appears to be impossible. I think the greatest masses fly near the shores of the great Canadian lakes, and sometimes so low, that they may be easily killed with a horse pistol, or even knocked down with a long pole."

Mr. John Townson's recollections of the passenger pigeon which is quoted in full in the appendix contains the following account of a flight: "One morning about the middle of April in . . . 1876 I happened to be on Toronto Island near the Eastern Channel, when I noticed what I supposed to be an immense black cloud over the lake to the southeast moving towards Scarboro' Heights, but as there was a moderate north

wind blowing I could not figure out how the cloud was moving against the wind. However, I did not have long to wait, as the moving mass changed its course and swung to the westward, and in a few minutes the northern edge of the cloud was directly overhead and I found myself gazing at an innumerable flock of wild pigeons.

"The birds were flying at a height, as near as I could judge, of probably 500 feet, but as the visibility was good there was no doubt about what they were as their long tails were clearly discernible. I took out my watch and that flock kept passing over my head for fourteen minutes. I think if my father had been there (reluctant as he was to use the word millions) he would have broken his rule that time. I could plainly hear the rushing sound made by the wings until the birds passed out of sight."

Mr. Pearson of Aurora says: "I have seen them in flight no doubt in the millions by standing on the streets in the little hamlet of what was then Mitchell's Corners, now the town of Aurora, and looking south towards the Oak Ridges a mile and a half away a line of birds creeping up over the tree tops with apparently no end, and looking north for three or four miles to the Holland Landing a continuous band of them twenty or thirty feet wide and continuing for hours every day, or say for two or three hours. This seems incredible, but so it was."

There are many such accounts of the great numbers of these huge migrations but unfortunately few have written of the aesthetic side of such a spectacle. The wild pigeon was a very handsome bird, graceful in form and harmonious in colouring; indeed the Pottawattomie chief Simon Pokagon said that "if the Great Spirit in His wisdom could have created a more elegant bird in plumage, form and movement, He never did." Such a bird in full flight must have been a magnificent sight, for even our common domestic pigeons can give quite thrilling aerial displays.

It is said of the wild pigeon (66): "When flying in flocks of hundreds or thousands you would think sometimes they were coming straight at you when all at once when within thirty or forty feet, they would make a quick turn to the right or left or upward, a swift and most graceful turn, and away in another direction. It would seem, sometimes, as if they just tried to see how near they could come and get away successfully. The flocks often seemed to fly hither and thither over the forests for the very joy of flight. When they flew to the east of you so that the sun shone on them there was a perfect riot of colour as they passed. The male birds were much finer looking and more showy than the females, and the sheen of their plumage in the evening sun was such that no words could be found to describe nor a painter to paint it. The flash of brilliant colour and the wonderful whirr of their wings in flight as they passed within a few yards can never be forgotten."

(Continued after Table 3 on page 80)

TABLE 3—MIGRATION FLIGHTS

County	Township	Locality	Date	Direction	Formation	Description or Comment
Brant.....	Dumfries South					Flights lasted almost continuously for several days.
Bruce.....	Amabel.....		Mid-April.....			Great spring flights which covered the sky for hours, followed by smaller flocks. Lasted for two or three days. Contained "millions" of birds.
Bruce.....	Kincardine....	Tiverton.....	Early fall.....	To west...	In a long line with narrow front. See p. 84 for explanation.....	Fall migration only in this locality. Flew west toward Lake Huron in a long narrow ribbon "like a railway track." "A wonderful sight."
Bruce.....	Kincardine....	Kincardine....	April, 1870, '71, '72.....	To north..	.....	Great spring flights "for weeks" over Kincardine.
Bruce.....	.....	.....	April 14-28, 1876	.....	.....	For two weeks prior to April 28 immense flocks were flying about in the county before settling to nest in Amabel (152) (Cf. report for Huron for same year).
Bruce.....	.....	.....	Spring(?) 1877.	.....	.....	Two large flocks passed over to north. Were not seen to return.
Carleton.....	.....	Ottawa.....	April 10-July 15 1859(c).....	To north..	.....	"With a double muzzle loader, within a mile of the city of Ottawa, between the tenth of April and the fifteenth of July, I shot 3500 pigeons on the banks of the Ottawa in their flight from south to north." Ham-merless Greener, (80). Considering the length of time covered by their flights it seems that the later ones must have been daily flights and not migratory.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Dufferin.....	Mono.....	Lot 19, 2nd line west.....	1872(c).....	To west.....	.....	Flying west ceaselessly for two and a half days. Was last flight in that region.
Dufferin.....	.....	.....	Sept., 1858 or 1859.....	.....	.....	A large flight.
Dundas.....	.....	.....	Fall, prior to 1860.....	.....	.....	Large flights.
Durham.....	Clarke.....	.....	"Summer" 1808	.....	.....	"During summer" remarkable flights darkened the air. Lefroy, (111a).
Durham.....	Darlington....	.....	Aug. and Sept., 1856-63.....	.....	.....	Came in myriads in August and Sept. to roosts in Darlington tp. Left end of September. All flocks were large, 500 or more.
Durham.....	Darlington....	Lot 7, Con. 3..	1865.....	To east.....	.....	The last large flocks of pigeons flew from west to east. Season not stated Squair, (165).
Durham.....	Darlington and Cartwright...	Between Ennis-killen and Caesarea.....	March, 1866...	.....	.....	Seen from stage coach going from Enniskillen to Caesarea. Flew from two to four-thirty o'clock. Snow in the woods around Caesarea trampled down by them.
Durham.....	Hope.....	Over Pt. Hope.	Spring, 1868(c).	To north-east.....	.....	Lasted three or four hours in the morning. Large and small flocks. Some so large that both ends were not visible at once. Sounded like a heavy rain.
Elgin.....	.....	.....	Fall, 1876 or 1877.....	.....	.....	Large fall flights lasted for several days. The last flights in this locality.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Elgin.....	Yarmouth.....	.....	Spring.....	To north..	.....	
Essex.....	Anderson.....	Amherstburg ..	April, October- November....	.....	.....	Great flights over Amherstburg.
Essex.....	Mersea.....	Point Pelee....	.....	.....	.....	"The older residents remember the vast flocks that once migrated through the point." Taverner and Swales, (170).
Essex.....	Mersea.....	Leamington....	April and Sep- tember, 1859, and after.....	Always to west.....	.....	From east to west in both seasons. Large flights lasting about three days. Greatest numbers on first day.
Frontenac.....	Kingston.....	.....	1878(c).....	.....	In a long line with a broad front ...	A large flock having a front of about a half mile.
Grey.....	Collingwood...	.....	Spring, 1875...	To north..	Long line with narrow front....	A large flock, $\frac{1}{2}$ mile long and 150 yds. wide. Last large flight in this locality.
Grey.....	St. Vincent....	.....	Prior to 1868 ..	To west...	Long lines with wide front.....	Nearly always flew in a westerly direction.
Grey.....	.....	Meaford to Col- lingwood.....	1875.....	To north- west.....	.....	Probably the same flight as the one above. Stretched from Meaford to Collingwood.
Grey.....	.....	.....	Spring, 1859...	.....	Long lines with wide front, in layers.	An exceptionally large flight during the potato-planting season.
Grey.....	.....	Near Owen Sound.....	Fall.....	To south..	Long line with narrow front....	Left altogether flying for one solid hour in a flock seven or eight rods wide.
Haldimand.....	Canboro.....	.....	Fall, 1844.....	To west...	.....	A flight lasting over an hour dark- ening the sky. In the morning. Clarke, (44).

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Haldimand.....	Walpole.....	South of Jarvis.	Spring.....	To north..	.....	Large flocks.
Haldimand.....	Walpole.....	Nanticoke.....	September.....	To west...	"Long, slender flocks." Four or five miles long ..	Fall flights only over Nanticoke. This and the above record are examples of much of the local and conflicting evidence which has been received.
Halton.....	Nelson.....	.....	Easter Sunday, 1847 or 1848..	To north..	.....	A great flock taking several minutes to pass. Early in the morning.
Halton.....	Trafalgar.....	.....	Spring, 1855 or '56.....	.....	.....	"The big flight." Large flights were in spring only in this locality. Flew high without stopping.
Halton.....	Trafalgar.....	.....	Spring, 1857 or '58.....	To north..	.....	An immense flight to north over the mountain. Darkened the sun for an hour. Followed for days by smaller flocks. Perhaps the same as the "big flight" above.
Halton.....	Trafalgar.....	Near Milton...	"In summer," 1869-70.....		Long lines with wide front.....	Last large flights in this locality. Bethune, (22c).
Hastings.....	Sidney.....	Near Quinte shore.....	Spring and fall.	In spring to north....	.....	Large flights spring and fall. One very large flight stopped in woods for about an hour. During sugarmaking.
Hastings.....	Thurlow.....	.....	Spring, 1880(c).	To east...	.....	An enormous flight. Last appearance in this region.
Hastings.....	.....	Bay of Quinte.	.....	.....	.....	Crossed Lake Ontario from south into this district.
Hastings.....	.....	Near Belleville.	Spring, 1845(c).	To north-east....	.....	Particularly large flight in this year. Large spring flights other years. Also one large one in early June one year, when corn was up.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Huron.....	Ashfield.....	.....	April 10, 1876..	.....	.....	Flocks began arriving about April 10 and kept coming for about 10 days. Fed on beechnuts, then left about May 1st in one vast flock. Headed over Lake Huron for Michigan. Took two hours to pass given point. Were in vast "cylinder like" flock half a mile in diameter.
Huron.....	Goderich.....	Clinton.....	Spring.....	To north..	.....	
Huron.....	.....	.....	Fall, 1872 to '75	To south..	.....	Flew south in large flocks in fall from Ashfield tp. colonies.
Kent.....	Romney.....	Wheatley.....	Spring.....	To north-west.....	.....	Always flew over Wheatley in a north-westerly direction.
Lambton.....	Bosanquet.....	Arkona.....	"Warm weather," 1872(c).	To east ...	.....	Last large flight over Arkona. Season not remembered but was in warm weather.
Leeds.....	Elizabethtown .	Near Brockville	Spring.....	To east ...	.....	Flew in the mornings down the river. One year only.
Lennox and Addington.....	Camden.....	1 mile from Moscow.....	End of April, 1867.....	.....	.....	Great flights. One flock more than five miles long.
Lennox and Addington.....	Amherst Island.	.....	Spring.....	To west...	.....	Three great spring flights during one man's lifetime. Against hard west wind. Sometimes lasting nearly all day.
Lincoln.....	Grantham.....	Pt. Dalhousie..	Spring, 1853-'58	Spring, to east. Fall, to west ..	.....	This direction contradicts all the information from this region.
Lincoln.....	South.....	.....	Spring.....	To west...	.....	Came with first warm weather

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Lincoln	Niagara	Niagara-on-the-Lake	"June or July"	To west		"The flight of the pigeons was to the westward along the south shore of Lake Ontario. The birds appeared tired and flew at a low level, rising over obstacles such as buildings and trees. . . . Their flight was continued westward, but on reaching the end of Lake Ontario they turned north into the wooded country between Barrie and Lake Huron." Mr. Elmes Henderson, Toronto.
Lincoln			Fall, 1872(c)		In extended lines.	In this year and for several years after there were small flocks on the fall wheat in the fall.
Lincoln and Welland		Niagara district	April 7, 1847			"Millions of wild pigeons pass over this town almost daily but altogether out of reach." <i>Niagara Mail</i> (140).
Lincoln and Welland		Niagara district	May, 1847	To north-west	"One continuous flock . . . which would dwindle now to a line and then widen out almost to cover the whole sky . . ."	An enormous flight from south to north and west around the end of Lake Ontario. Recorded in the Niagara papers (140). Flew both low and high.
Lincoln and Welland		Niagara district	April 1-4, 1872	To west		A great flight lasting 4 or 5 days. Was almost continuous for the first three. Birds spent the night in woods along shore of Lake Ontario. (C. W. Nash to J. R. Dymond, verbally).

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Lincoln and Welland.....	.....	Niagara district	Spring. Reign of George III....	To west....	.....	"Clouds of wild pigeons passing from east to west in the warm spring months." Clark, (43).
Lincoln and Welland.....	.....	Niagara district	Fall, 1870(c)...	To south-west.....	.....	Fall flights were evidently toward the southwest as they were supposed to be headed for Long Point to feed on wild rice!
Manitoulin Island	.....	Lake Kagawong	Early June, prior to 1880..	To north..	In long strings, with narrow front	Took two or three hours to pass over. No southern flights reported.
Middlesex.....	Caradoc.....	.....	Spring.....	To north-east.....	In long lines.....	Spring flights sometimes took one or two hours to pass a given point.
Middlesex.....	Dorchester....	.....	Spring, end of sugar-making.	To north-east.....	Long line with narrow front....	Great spring flights all day for many days.
Middlesex.....	Dorchester....	.....	Sept. 25(c).....	.....	.....	Left in fall in smaller flocks.
Middlesex.....	London.....	London.....	Fall (?), 1864 ..	To south-west.....	Long line with narrow front, about 80 ft. wide.	A great flight, lasted all day. Described in letter to W. E. Saunders from Atwell Fleming, Sr., of Toronto.
Middlesex.....	London.....	London.....	Spring, 1868...	To north..	Small flock of about 300.....	From the same letter. Snow still on the ground. Last flight seen by Mr. Fleming.
Middlesex.....	.....	N. Middlesex..	Fall.....	.....	Long line with narrow front....	Large fall migrations.
Middlesex.....	.....	.....	Spring, early April.....	To north-east.....	.....	In large numbers.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Middlesex			Spring, 1876			The last regular flights in this region. W. E. Saunders, (22c).
Norfolk	S. Walsingham	Long Point	Spring and fall, 1822(c)			"Immense flocks of the passenger or wild pigeon frequent this and other parts of Upper Canada during the spring and autumn." Howison, (92).
Norfolk	Charlotteville		Spring			Occurred in thousands in spring flights.
Northumberland	Hamilton	Coburg	Spring, prior to 1860	To north		Great flights over Cobourg. Dr. Bethune, (22b).
Northumberland	Hamilton	Baltimore	Spring and fall	North in spring and south in fall		Flying over village.
Northumberland	Murray		Spring ?	To north-west	Covered sky	Great flights which lasted all day. The spring season is surmised from direction of flight.
Ontario	Pickering	Audley	End of April, 1876		Long lines with broad front	A great flight in the early morning.
Ontario			Spring and fall, prior to 1866			Great flights.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Oxford.....	Oxford.....	Woodstock region.....	About April, 1869 or 1870..	To east....	.....	An enormous flight lasting from daylight till dark for several days; 400 were shot with old double-barrel muzzle loader between daylight and 10 a.m. on one morning as flocks flew low over a fence at the top of a hill. In previous and following years there had been the "usual" spring flights in this region. P. R. Lowe, (115).
Perth.....	Fullerton.....	Mitchell.....	Spring, 1872...	To north-west.....	.....	Took an hour to pass over.
Perth.....	Hibbert.....	.....	End of April, 1870(c).....	To north..	.....	A great flight which covered the sky and darkened the sun.
Peterborough....	Douro.....	Lakefield.....	Fall.....	.....	.....	Stopped to feed on stubble.
Peterborough....	Douro.....	Lakefield.....	End of April, 1858.....	.....	.....	A great flight... flew all day in immense numbers. (Information sent by F. M. Atwood, a descendant of Mrs. C. P. Trail).
Prince Edward...	.....	.....	Late May or early June, 1870 (c).....	To west....	.....	An enormous flock flying to the west. Darkened the sun for twenty minutes at least.
Renfrew.....	McNab.....	Near Arnprior..	Spring and fall.	.....	.....	Only relatively small flocks in this region in the spring. Flocks of 20 to 50 continually flying over. Congregated in fairly large numbers in grain fields in fall.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Simcoe.....	.....	Kempenfeldt Bay.....	April 4, 1838(c)	.....	.....	Great flocks of pigeons settled down in a fog in the early morning. Head, (88).
Simcoe.....	.....	Kempenfeldt Bay.....	March 19, 1858. Early arrival following "mild winter"	To west & northwest.	.....	Immense flights along shores of the bay. One flock at least three miles long. Large flocks flew high. Small flocks lower, and stopped in the woods. Correspondent, (49).
Simcoe.....	.....	.....	Spring, 1840(c).	.....	.....	Millions in the spring.
Simcoe.....	.....	.....	Spring, 1852-55	.....	.....	Large spring flights. Flew for week or more.
Simcoe.....	.....	.....	Spring.....	To west...	.....	Large flocks flying from east to west.
Simcoe.....	.....	.....	Spring and fall.	.....	In straight lines..	"Always drew out in a straight line."
Victoria.....	Verulam.....	Bobcaygeon ...	Fall, about Sept	.....	.....	A few stragglers remained behind for a few days.
Welland.....	Pelham.....	Near Fenwick..	March, 1869...	To south-west.....	Long lines with narrow front....	An unusual direction for a spring flight. A large flight, darkened the air during afternoon; some stopped in woods to eat beechnuts. Last large flight in this region.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Welland.....	Thorold.....	Fonthill.....	April, 1870....	To south- west.....	Long lines with narrow front....	A great flight; lasted two days, flying low. Last large flight in this region. It seems as though this flight and the one above must be the same. Fenwick and Fonthill are near each other and had flights occurred in this unusual direction in two separate years they should have been seen in both places. It was suggested that these birds were leaving the country, but it seems more probable that they were headed for S. Welland where large nestings took place in 1870.
Welland.....	Pelham and Thorold.....	Fenwick and Fonthill.....	Prior to 1870...	To north...	Long lines with narrow front....	Prior to the above flight (or flights) the general direction of spring flights over North Welland was to the north.
Welland.....	.....	Lake Erie shore	Spring.....	To east ...	.....	Spring flights along Lake Erie shore were from west to east.
Wellington.....	.....	.....	End of March, 1st of April, 1853-56.....	.....	.....	Flocks very numerous.
Wellington.....	Guelph.....	Guelph.....	1852-69.....	To west in spring, to east in fall	In layers.....	See text following for detailed description. Howitt, (93).
Wentworth.....	Ancaster.....	.....	End of May, 1st of June. Fall, about 1850 ...	To west...	.....	Millions—darkened the sun. Were commonly flying over this region for about six years. Flew more or less all summer, always to the west. (This suggests daily flights. See page 92).

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
Wentworth.....	Barton.....	Hamilton.....	Fall, 1870(c)...	To south..	.....	Flew to south over Hamilton in the fall.
Wentworth.....	Barton.....	Hamilton.....	April 10, 1836	.....	.....	"Emigration on an unusually grand scale has commenced amongst... the Pigeons; and the town and country loungers are already actively engaged in furnishing the housewives with the materials for a Pigeon Pie. Crack, crack, crack, is the order of the day." Rolph, (153).
Wentworth.....	.....	.....	1854.....	To west...	.....	This year seemed to be the maximum of annual migrations in this region. Could be seen every day from mid-April to end of June flying west, which suggests daily flights. See p. 92. McIlwraith, (129).
York.....	E. Gwillimbury.	Newmarket....	.....	To north..	.....	Sir William Mulock of Toronto says that pigeons used to fly north <i>at night</i> over Newmarket, though he thinks it may have been toward morning. This is the only mention of night flying unless it might be surmised from the flock which came down in a fog at Kempenfeldt Bay at dawn.
York.....	King.....	Near Schomberg	Late '60's, fall..	To south-east.....	.....	A great flight, many large flocks.
York.....	King.....	.....	Fall, 1873.....	.....	.....	Great flocks flying about in the township in the fall. The last large flight in this region.

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
York.....	King & Whit-church.....	Aurora.....	1850 and later..	To north..	L o n g line with narrow front....	Would fly in long line, sometimes six miles in length over Aurora. For two or three hours daily. See text p. 92.
York.....	Markham.....	.....	1860.....	.....	The main flock was long with narrow front....	A great flight of pigeons, one large flock preceded and followed by smaller ones.
York.....	York.....	Toronto, Don Valley.....	Spring.....	To north..	.....	Used to fly up valley of Don each spring, numbers varied from year to year (Mr. Townson).
York.....	York.....	Toronto.....	Mar. 27, 1815..	To east ...	.....	Immense flights from west to east reported in Toronto papers. Fleming, (69).
York.....	York.....	Toronto.....	Last week in March, 1858..	To north..	L o n g lines with narrow front....	Great flocks passed over Toronto. Some lines stretched further than the eye could see on either side. Bethune, (22a).
York.....	York.....	Toronto.....	March 8, 1860..	.....	.....	Large numbers. Bethune, (22a).
York.....	East York.....	Lot 15, Con. 2..	March 27, 1868	To north..	L o n g lines with broad front.....	Flying low from 7 a.m. until 1 p.m. In flocks $\frac{1}{2}$ mile deep by 3 or 4 miles wide.
York.....	York.....	Toronto, near St. James Cemetery.....	Spring, 1869...	.....	.....	A great flight, lasting several days. Many hundreds were shot; the gunners using holes, left by the removal of some large pine stumps, as gun pits. (From an account by John R. Humphries, of Toronto.)

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
York.....	York.....	East Toronto..	Fall, 1871.....	.....	.....	This great flight settled for the night where the Woodbine race track is now.
York.....	York.....	Toronto Island.	Mid-Apr., 1876.	To west...	.....	A great flock came from the south-east at a height of about 500 ft. Took 14 minutes to pass over. Timed by Mr. Townson of the Toronto <i>Globe</i> , see p. 63.
York.....	York.....	Todmorden....	1877.....	.....	.....	A great flock lit on a farm at Todmorden. Season not given.
York.....	York.....	.....	.....	To north..	.....	Spring flight across lake from south. $\frac{1}{4}$ mile wide, longer than eye could see. Lasted over half an hour.
York.....	York.....	Toronto.....	Mar. 31, 1851..	.....	.....	First seen. Smith, (163).

The following is a set of records taken from the Canadian Journal, (37), over a period of several years, mostly from "Notes on the Monthly Meteorological Register at the Provincial Magnetical Observatory, Toronto, Canada West."

York.....	York.....	Toronto.....	Aug. 5, 1853...	.....	.....	In flocks, (37a).
York.....	York.....	Toronto.....	Apr. 25, 1854..	To north..	.....	Numerous and passing north, (37b).
York.....	York.....	Toronto.....	June 24, 1857..	.....	.....	Numerous, (37c).
York.....	York.....	Toronto.....	Mar. 13, 1860..	.....	.....	Very numerous, (37d).
York.....	York.....	Toronto.....	Apr. 13, 1861..	.....	.....	Numerous, (37e).
York.....	York.....	Toronto.....	Apr. 9, 1862...	.....	.....	Observed, (37f).
York.....	York.....	Toronto.....	Apr. 19, 1863..	.....	.....	Observed, (37g).
York.....	York.....	Toronto.....	Apr. 14, 1867..	.....	.....	Passing north, (37h).

TABLE 3—Continued

County	Township	Locality	Date	Direction	Formation	Description or Comment
York.....	York.....	Toronto.....	Mid-Apr. 1868.	.....	.....	An immense flock, (37i).
York.....	York.....	Toronto.....	Apr. 14, 1869..	.....	.....	Large flocks, (37j).
York.....	York.....	Toronto.....	Apr. 3, 1871...	.....	.....	Large flocks, (37k).
York.....	York.....	Toronto.....	Apr. 10, 1872..	.....	.....	Numerous, (37l).
York.....	York.....	Toronto.....	Mar. 13, 1875..	.....	.....	Noted, (37m).
Lake Ontario....	.....	.....	Previous to 1795	To south..	.....	The great flight described by Isaac Weld, Jr., (185), see p. 19.
Lake Ontario....	.....	.....	Apr. 13, 1876..	.....	.....	Numerous flocks flying across Lake Ontario and St. Lawrence every morning.
Montreal to Kingston	.....	.....	Sept., 1796c....	To south..	.....	Several large flocks seen in the woods in September. "During particular years these birds come down from the northern regions in flights that it is marvellous to tell of. Isaac Weld, Jr., (185).

Even though Chief Pokagon's article (146) has been reprinted practically in full in Mershon's book (131), I feel that I may justifiably quote from it again for its artistic worth. "I have seen them move in one unbroken column for hours across the sky, like some great river, ever varying in hue; and as the mighty stream sweeping on at sixty miles an hour, reached some deep valley, it would pour its living mass headlong down hundreds of feet, sounding as though a whirlwind was abroad in the land. I have stood by the grandest waterfall of America and regarded the descending torrents in wonder and astonishment, yet never have my astonishment, wonder and admiration been so stirred as when I have witnessed these birds drop from their course like meteors from heaven."

Comments on Migration Flights

Ectopistes migratorius, as its name is meant to imply, was highly migratory. Being so very gregarious its actions were controlled by food supply to a much greater extent than in the case of most other species of bird. Other gregarious birds such as the gannets and murrelets of our coasts, or the southern penguins, have an unlimited source of food which travels by their very "doors," but the pigeons' mast as well as other food was stationary and had to be sought out each year, often in a new locality.

After a superficial survey of the records of erratic arrivals and departures, appearances and disappearances of these birds it would seem that they were governed wholly by caprice and improbable that they had any fixed routes of migration (see Table 3, p. 65). Little has been said on this subject in the literature and therefore it was with considerable interest that the maps used here as illustration were marked in the hope that something definite in migration tendency might become apparent.

Spring Migration

As indicated before the data that we have on migration apply only to the later years of *Ectopistes*' existence in Canada, and it can never be known to what extent migration routes may have been modified to suit changing conditions. There appear to have been in the times of which we have knowledge, three routes of entry into Ontario—one by way of the western end of the province between Lakes Erie and Huron, one by the Niagara Peninsula, and one around the eastern end of Lake Ontario. On first thought it appears strange that such a notoriously strong and swift flyer as the passenger pigeon should trouble to skirt such lakes as Erie and Ontario which it could pass over in less than an hour's flight, but a closer study of the facts presents an apparently

reasonable solution. Flights that came in by the land routes were generally low and in one or two instances it has been said that the birds seemed tired. Probably these were flocks that were nearing the end of a long journey and were looking as they went for a suitable place to pitch for food, or for a prospective nesting site.

Mershon says (131a): "Now that the pigeons had come they would 'fly' every morning. This we knew from years of observation in the great migration belt of Michigan. They would fly lower to-morrow morning, and in a day or two more sweep low enough for the sixteen-gauge and the number eight shot to reach them."

MAP 4—Showing spring flights of passenger pigeons. Arrows indicate direction of flight.

This theory is borne out by the fact that many of the flights which did cross the lakes directly were evidently flying high with a more distant objective.

Spring migrations were on the whole well directed movements of massed forces which, having once chosen a route, held to it for many days and only showed an erratic tendency when nearing their destination. "The immense flocks of pigeons which have been flying over various

parts of the country in an undecided way for the last week or two have gathered in the township of Amabel, in countless numbers, and have begun building" (152).

I think too that this erratic tendency grew as the birds became more persecuted towards the end of their existence. Several instances have been received of what appear to be unusually late spring movements which were doubtless the result of having been driven from a selected nesting area. This supposition is strengthened by reports from Michigan and Pennsylvania, of nesting colonies being so persecuted that the birds were forced to leave the district altogether, doing so in a mass flight. J. S. Van Cleef of Poughkeepsie, New York, is quoted in Mershon (131i) as follows: "This flock had nested in Missouri in the month of April, and most of the squabs were killed. . . .When the nesting was over the entire flock went to Michigan, where they nested again, and they were followed there by the same persons who again destroyed the squabs. When they left Michigan they took their flight eastward, and telegrams were sent all over that part of the country where the pigeons would be likely to nest a third time, and as soon as they settled in the Catskills these persons were apprised of the location and very soon appeared on the scene."

Fall Migration

As compared with spring flights fall movements were much more wandering and unorganized. Apparently after the nesting season the birds scattered in small flocks over the country, drifting about in search of food until the cold weather, sometimes congregating in fairly large numbers in favourable localities. Even though this had not been definitely stated in the information we have it would be obvious from the Fall Migration map which shows few definite flight records but several closely dotted areas throughout which fall movements were noticed.

Although a desultory migration was the common thing in this season there were evidently occasional large flights. The great one recorded by Weld (185) and already quoted (page 19) was most likely one of these and there are other instances from Bruce, Haldimand, etc. It seems probable that they may have been connected with large roosts—that is, in some localities roosts were formed which were used not only during the breeding season but all through the summer and here in the fall very large numbers of pigeons would assemble. For instance there were great roosts in Durham county, Darlington township, where, in August and September, there came "myriads" of birds and from which there appears to have been a general exodus toward the end of September.

One of our correspondents stated that this was the common tendency where late summer flocks were not broken up by hunters.

These flights had, of course, a general southern trend, and in southwestern Ontario there seems to have been a decided western drift. Flocks from the Niagara region which arrived from the east seemed to leave toward the west, and in Kent county the general tendency was also in that direction. There is however little definite information for this season of the year and the preceding statements are largely surmise.

MAP 5—Showing fall migration of passenger pigeons. Large dots indicate definite fall flights—arrows show direction. Dotted areas are those throughout which fall movement took place.

Formation

The heading "Formation" in the table of migration flights needs some explanation and comment. There has been considerable discussion as to the way in which the migration flocks were arranged, some saying that they flew in long lines thus:

Formation 1

i.e., "Long lines
with a
narrow front."

Others that they flew in long lines thus:

Formation 2

i.e., "Long lines
with a
broad front."

the number of these lines varying from one to several in a flight, and in the case of Formation 2, being sometimes in irregular layers one above the other. They varied in length, some being so long that both ends disappeared beyond the horizon, and they also varied in width, from a few feet to many yards.

That the usual form of flight was in long lines is very evident, from many accounts of the species, but it has been difficult in most cases to discover which formation these lines took. From definite records in our questionnaires where it was obvious which was meant, eight correspondents say they flew in Formation 1, and seven say they flew in Formation 2. It would seem therefore that both were used, some saying that No. 1 was used for short distances only, No. 2 being the common formation, in layers, for the great spring flights.

This latter was the case as observed by Dr. Bethune of Toronto and Dr. Henry Howitt of Guelph. The former says (22a): ". . . flock after

flock of pigeons crossed from the south at Toronto. All of the flocks were fairly long, from east to west, and some of them reached farther each way than one could see, but all were of short dimensions from north to south. I could not, of course, give the exact depth of these flocks, but it would be something like 100 yards or less." While the latter states (93): "With the exception of two or three years from 1852 until the pigeons disappeared completely in our district, I spent hours, more than once most of the day, observing the April flights. And every year of my observations I paid particular attention to the altitude, direction, contour, and the strata formation of the spring flocks; also from what quarter they came and disappeared. Invariably the flocks which passed over my observation place first became visible in the East, well above the distant forest horizon, like mist or haze that, on nearer view, quickly became a flock of pigeons which, in like manner, faded from sight in the West; altitude about a quarter of a mile, and direction, a straight line from East to West; and all the flocks to right or left of me did likewise.

"Every year all the spring migration flocks resembled one another in contour very closely; all had strata formation; the small ones had only two or three strata, the large ones, about thirty or more, according to their size. In every case the lowest stratum was longest in every direction; each stratum above it to the top was one or two birds shorter than the stratum below it; hence in every direction there was a slope from top to bottom; in every flock the front slope was the shortest, the rear one, the longest of all, and those of the sides were considerably longer than the front one. The space between the several strata appeared less than a foot, and all the birds of all the strata seemed to have only enough space sideways to move their wings freely.

"The strata of the large flocks were always limited in number to less than forty. The lowest stratum of all the flocks was nearly as level and even as the surface of a lake on a calm day; so were all those above it. According to my memory, the wings of all the birds of each flock moved synchronously with the wings of the leader. The speed of the spring flight was estimated by many to be a mile a minute, and in my opinion this was not an exaggeration—always faster than all the other kinds of flights. And of all kinds, the distance from side to side was greater than from front to back."

An explanation of the two formations is given by Alexander Wilson (191a). "A column eight or ten miles in length would appear from Kentucky, high in air, steering across to Indiana. The leaders of this great body would sometimes gradually vary their course until it formed a large bend of more than a mile in diameter, those behind tracing the

exact route of their predecessors. This would continue sometimes long after both extremities were beyond the reach of sight, so that the whole with its glittery undulations marked a space on the face of the heavens resembling the windings of a vast and majestic river. When this bend became very great the birds, as if sensible of the unnecessary circuitous course they were taking, suddenly changed their direction, so that what was in column before, became an immense front, straightening all its indentures, until it swept the heavens in one vast and infinitely extended line."

To quote further from published authorities—Audubon (9) describes a great flight toward the southwest in which the birds flew in "immense legions . . . with a front reaching far beyond the Ohio on the west and the beechwood forests directly on the east of me."

Chief Pokagon, in his article already quoted (146) says: "I have seen them fly in unbroken lines from the horizon, one line succeeding another from morning until night, moving their unbroken columns like an army of trained soldiers pushing to the front, while detached bodies of these birds appeared in different parts of the heavens, pressing forward in haste like raw recruits preparing for battle. At other times I have seen them move in one unbroken column for hours across the sky, like some great river. . . ."

There are also records of large single flocks which varied in shape, some being "formless masses", others being thus:

Others being thus:

These tapering masses, some of which were very large, seeming to cover the whole sky at times, usually being preceded and followed by smaller flocks.

The height of migration flights varied considerably. Often the birds were so low that they had to rise to pass over trees and houses and could be whipped down with poles from hill tops; and at the other extreme a Michigan report says they have been seen so high in the air that they looked like sparrows.

When in full flight and far from their destination they apparently flew high—the flock seen by Mr. Townson over Toronto Island being, he said, at about five hundred feet, and other reports say that they flew well out of gunshot.

FLIGHT

As may well be imagined the actual flight of the passenger pigeon was exceedingly swift and graceful. It flew at a great speed which has been estimated as reaching sixty miles an hour. Mr. Justice Latchford of Toronto says: "The flight was very rapid and exceedingly graceful. While direction was held each bird appeared a law unto itself, swaying and twisting and veering, yet never colliding with one of its fellows." Professor MacClement of Queen's University says: "The flight of the tame pigeon is quite similar to that of the wild pigeon but the flight of the latter looked even more graceful and dashing, partly due to their long tails. They flew directly toward their object in long, dashing curves."

Many people mention the habit of rolling or twisting in flight and also of zig-zagging when taking to the air and of taking a second or two to get "straightened away."

Another interesting characteristic of the birds when in full flight, which has been mentioned by Wilson, Mershon and some of our correspondents, is that of a portion of a flock making a sudden downward plunge, as of a water-fall, the birds behind following the lead of those gone before and dropping down at the same spot in the air, this continuing for some time. The explanation is variously given as due to "thin" spots in the air or the stoop of a hawk upon the flock from above.

ARRIVAL AND DEPARTURE

With most species of birds migration is a very regular performance. It is usually possible to tell within a few days when a certain bird will arrive in a given locality in the spring and leave in the fall, but this was evidently not always true of wild pigeons. In a general sense they exhibited the customary northward in spring, southward in fall, tendency, but within this broad movement there was considerable local variation. That it should be so seems reasonable enough when their great numbers

and gregarious habits are taken into account. Their local wanderings would quite naturally be controlled by immediate food supply, abundance of mast, for instance, in one region, causing stop-overs which would mean variability in arrival in some other region. (See Migration Flight table, Huron county, Ashfield township, April 10, 1876.) It is said, too, that their movements became more irregular toward the end of their existence when they were driven from one region to another by their persecutors.

Spring Arrival

In the discussion of migration flights it was shown that spring movements were more purposeful and concentrated than the autumn southward drift, and in consequence there is available a series of reliable and authoritative dates which make definite statements possible.

A series of dates for spring arrivals is given in the accompanying table that covers a period of one hundred years. The dates range from March 8th to June 24th with the majority in the month of April. It is perhaps unfortunate that so many items refer to one locality, the Toronto region, but I think there is enough other material to indicate that the Toronto records are quite typical for southern Ontario generally.

There is also a mass of evidence of a less definite nature in the questionnaires which corroborates the variability of these dates. Statements that pigeons arrived "during sugar making", "at the time of spring sowing", "during potato planting", show a range from the middle of March to the middle of May.

Early arrivals were evidently not unusual since there is considerable proof of such in addition to the seven dates in the table. Several of our correspondents have told of pigeons coming before the snow was gone, of seeing it trampled by them in the woods, and have wondered how the birds could subsist so early in the year before the appearance of any plant life; and also there are references in the literature to nestings which were begun before the snow was off the ground. "In 1865 a heavy nesting was in Canada, near Georgian bay . . . and the snow was two feet under the nesting." Mershon (131e). The Petoskey nesting of 1876 or 1877 began when snow was twelve inches deep in the woods. (Brewster, 30a). Mr. Townson of Toronto was told that in 1854 pigeons arrived at Toronto on February 22nd, but he considered it too unauthoritative a statement to be given much prominence.

It is becoming steadily more apparent that weather has little to do with spring migration of birds. The migratory species obeys an urge from within rather than responding to an impulse from without; and this is well illustrated by a few data concerning early arrivals of *Ectopistes*. It might seem a logical conclusion that early arrivals should follow upon

TABLE 4—ARRIVAL DATES

Year	Date	Locality	Authority
1779.....	March 8.....	Niagara, Lincoln county.....	Butler, (53).
1815.....	March 27.....	Toronto, York county.....	Fleming, (69).
1833.....	April 6.....	Peterborough, Peterborough county ..	Need, (138a).
1834.....	April 1.....	Verulam township, Victoria county...	Need, (138b).
1838.....	April 4.....	Kempenfeldt Bay, Lake Simcoe.....	Head, (88).
1847.....	April 7.....	Niagara district.....	The Niagara Mail, (140).
1847.....	May	Niagara district.....	Reported in Niagara papers, (140).
1850.....	June or July.....	Niagara district.....	Mr. Elmes Henderson, Toronto, letter.
1851.....	March 31.....	Toronto, York.....	Smith, (163).
1854.....	April 25.....	Toronto, York.....	<i>Canadian Journal</i> , (37b).
1857.....	June 24.....	Toronto, York.....	<i>Canadian Journal</i> , (37c).
1858.....	March 19.....	Kempenfeldt Bay, Lake Simcoe.....	"Correspondent," (49).
1859.....	April 10-July 15.....	Ottawa, Carleton county.....	Hammerless Greener, (80).
1860.....	March 8.....	Toronto, York.....	Bethune, (22a).
1860.....	March 13.....	Toronto, York.....	<i>Canadian Journal</i> , (37d).
1861.....	April 13.....	Toronto, York.....	<i>Canadian Journal</i> , (37e).
1861.....	April 13.....	Stratford, Perth County.....	<i>Canadian Journal</i> , (37g).
1862.....	April 9.....	Toronto, York.....	<i>Canadian Journal</i> , (37f).

TABLE 4—Continued

Year	Date	Locality	Authority
1863.....	April 19.....	Toronto, York.....	<i>Canadian Journal</i> , (37g).
1867.....	April 14.....	Toronto, York.....	<i>Canadian Journal</i> , (37h).
1868.....	March 27.....	East York.....	Questionnaire
1868.....	Mid-April.....	Toronto, York.....	<i>Canadian Journal</i> , (37i).
1869.....	April 14.....	Toronto, York.....	<i>Canadian Journal</i> , (37j).
1871.....	April 3.....	Toronto, York.....	<i>Canadian Journal</i> , (37k).
1872.....	April 10.....	Toronto, York.....	<i>Canadian Journal</i> , (37l).
1875.....	March 13.....	Toronto, York.....	<i>Canadian Journal</i> , (37m).
1876.....	April 14.....	Bruce county.....	<i>Paisley Advocate</i> , (152).
c. 1880.....	Early June.....	Manitoulin Island.....	Questionnaire
	About June 10.....	Mattagami river, district of Timiskaming.....	Questionnaire
1881.....	April 15.....	Bowmanville, Durham county.....	Dutton, (58a).
1883.....	March 20.....	Welland county.....	C. E. L., (103).
1885.....	May 10.....	Ottawa, Carleton county.....	Scott, etc., (156).
1886.....	April 15.....	Ottawa, Carleton county.....	White and Macoun, (189).
1887.....	Sept. 3.....	Ottawa, Carleton county.....	First appearance of the year. Macoun and White, (122).

mild winters, but this is not the case. On making inquiries at the Toronto Meteorological Office as to the temperature of the years in which arrivals were in March, it was found that in every case but one the winters were colder than the average. For example in 1860 pigeons flew over Toronto on March 8th and yet that winter the temperature had been 5° lower than the mean; again in 1875 they came on March 13th after a decidedly cold winter, which was 9.1 below the average. In fact in only one instance did an early arrival follow a so-called mild winter. This was in 1858 which was said to have been mild by the correspondent of the "Canadian Naturalist and Geologist" (49), (see Table, 1858, Kempenfeldt Bay), but was merely "average" according to the Meteorological Office.

That these early arrivals were sometimes disastrous to the birds is apparent. There is one record from Welland county that tells of them coming about the first of April and being caught in a late spring storm and freeze-up, in which many starved to death and others came in great numbers to barn-yards for the grain scattered there.

The question of late spring arrivals has already been discussed under nesting habits and migration flights, and the suggestion made that they were dependent on food conditions, earlier nesting further south and, in late years, on persecution.

These remarks apply really only to Ontario south of the Districts. Information is too scarce from Northern Ontario for anything definite to be stated in respect to that region. The two northern records that we have—for Manitoulin Island and the Mattagami river—are both in June. But two reports are quite insufficient to allow of even a tentative statement for so large a region, although Swainson and Richardson (168) state that: "This celebrated bird arrives in the fur-countries in the latter end of May." (See footnote, p. 51.)

Fall Departure

The autumn movement has been discussed at some length under "Migration Flights," and little need be added here. As already shown, it was apparently quite desultory in character, the custom being for the birds to scatter over the country when nesting was done and so drift about until well on into the fall. This habit led people living near a deserted nesting to state that the birds "left the country" in June or July as the case might be. The time of their going was governed by food supply, a Dufferin county record saying that early October was the usual time of departure unless beech nuts were plentiful, in which case they would linger until November 1st.

That, on occasion, they stayed even later than this is apparent.

Hutchins (95), as quoted before, says: "It is a hardy bird, continuing with them [Moose Factory] until December." Mr. R. B. Elgie of Toronto remembers a flock of seventeen which he saw in a corn-field at Dixie near Toronto on New Year's day about 1865. This flock, he said, had been in the neighbourhood for some time. In Pennsylvania, according to Anderson (38): "They would stay in the fall until the weather commenced to get cold, but some would stay all the year round."

DAILY FLIGHTS

Relation to Brooding

Aside from migration flights, *Ectopistes migratorius* performed daily flights in connection with its various activities which were very regular in their occurrence and route. Those of greatest interest were to and from the nesting colonies, when the flocks consisted, with regularity, of either males or females; that is since the sexes alternated in brooding, as has already been described, those that were not on the nests left in large bodies for their feeding grounds at definite hours and returned with equal regularity to relieve their mates.

Eaton (59) describes this habit at a colony in Alleghany county, and states that the males left in the early morning returning about 11 a.m. to replace the females, which in their turn came back about 3 p.m.

Brewster (30a) says: "Both birds incubate, the females between 2 o'clock p.m. and 9 o'clock or 10 o'clock the next morning; the males from 9 or 10 o'clock a.m. to 2 o'clock p.m. The males feed twice each day, namely, from daylight to about 8 o'clock a.m. and again late in the afternoon. The females feed only during the forenoon. The change is made with great regularity as to time, all the males being on the nests by 10 o'clock a.m." Whitman (39d) states that in all species of pigeons with which he was acquainted the cocks incubated from about 10 a.m. to 4 p.m. Mr. Ben O. Bush, a correspondent of Mershon's, says that if the feeding grounds were at a great distance from the nesting colony only one change was made in twenty-four hours, males and females having alternate days off (131 h). Some of our correspondents say that pigeon hunters were governed by the time of movement and sex of the flocks, as some people favoured one sex more than the other as food.

Flights for Food, Water, etc.

Nesting colonies, feeding grounds, drinking places and roosts were often in separate localities, necessitating several cross-country flights a day. "The places where they fed and those where they got water were often miles apart. The nests were often not near either of these places."

TABLE 5—DAILY FLIGHTS

County	Township	Description
Bruce.....	Amabel.....	From nesting colony near Wiarton, toward Owen Sound where the flocks divided, some going east and some west. In small flocks in May and June, 1869.
Bruce.....	Kincardine.....	Back of Kincardine scattered flocks flew each morning. Large ones each evening returned to roosts.
Dufferin.....	Mulmur.....	At harvest time daily flights took place to and from a rookery night and morning.
Elgin.....	Alborough and Dunwich....	Returned to nesting sites each night.
Frontenac.....	Kingston.....	Flew every night from nesting site to roost two miles away.
Grey.....	Glenelg.....	Came regularly in the evening to feed on a drained river bed. (River flooded and drained each day by mill dams.)
Grey.....	Proton.....	Came each evening to spring on farm near Proton and roosted in surrounding cedars. Left early each morning.
Grey.....	St. Vincent.....	A flock consisting of thousands of birds was seen three times daily near Meaford in 1868.
Grey.....	Sydenham.....	Flocks from colonies on east and west sides of Nottawasaga Bay flew to the east over this township beginning at 8 a.m. and returning in the afternoon.
Hastings.....	.....	Had definite drinking places to which they came daily.

TABLE 5—Continued

County	Township	Description
Huron.....	Ashfeld.....	Flew out each day about five miles from the colonies to feed. 1872-75.
Lambton.....	St. Clair River.....	Flocks flew daily across the river in the morning to Michigan, returning at night "to roost in Northern Ontario." In June and July, 1866. Clarke, (44).
Peterborough.....	Douro.....	Soon after daylight came from west swiftly in thousands, returning evidently by some other route. 1831. Strickland, (166).
Prince Edward.....	Hillier.....	Came every day to drink to lot 20, Con. 1, from the northeast, from the direction of the "big swamp". About 1876.
Simcoe.....	Sunnidale and Flos.....	Returned to breeding colonies in pine woods in large flocks at evening.
Simcoe.....	Tecumseh.....	Flew in evening to northwest, perhaps to nesting sites in Mulmur township, Dufferin county.
Victoria.....	Verulam.....	Flew night and morning to and from nesting colonies.
Welland.....	Bertie.....	Came daily from New York State, or Pennsylvania in May; June and August, stayed a few hours a day, perhaps one week each month. In big flocks of four or five thousand.
Welland.....	Wainfleet.....	Flew night and morning to and from the "Big Marsh" which was used as a roost.
York.....	Whitchurch and King.....	Flew over Aurora to west in the morning, to east in the evening (from and to Pine Orchard?).

(Mr. D. Nelson Phillips, Laurel, Ontario.) In going to and from such localities definite routes were used; the route *towards* one often being different from the route *away* from it. This fact is mentioned in Strickland's account (166) for Peterborough county (see Table 5), and also Mershon (131b) says: "The Pigeons in this particular locality have followed the same routine as long as I have known them. They only fly in the morning, always going in the same direction, and I can't recall seeing them coming back again, or flying later in the day."

It is said that morning flights were more scattered, while the evening return to the nesting colony or roost was more definitely concentrated.

FOOD

Pigeons as a family feed upon vegetable material—fruit, berries, seeds and grain are the staples of their diet. An occasional variation is supplied by worms or grubs, grasshoppers or caterpillars. Passenger pigeons seem to have been faithful to the family tradition, keeping within the prescribed bounds; although when we consider the number of these birds existing in North America in the days of their great abundance we are tempted to question how nature could possibly feed such a horde within any limits whatever. That it was done is obvious, and the solution must lie in the fact of the vastness of the forests and the prodigality with which seeds and berries were produced. One of our correspondents says: "Those grey elms, virgin forest trees, produced elm nuts [elm seeds]. When they were ripe they could be shovelled off the ground" and no doubt other species of trees and plants were equally fruitful.

Early References

There is considerable reference in the literature to what wild pigeons ate, the earliest seeming to be in the "Jesuit Relations" for 1616 (176b), where Biard says: ". . . there are a great many wild pigeons, which come to eat raspberries in the month of July. . . ." In 1672 there are the references already quoted from Nicolas Denys (77 a & b), in which he tells of incredible numbers of pigeons coming to parts of eastern Gaspé for strawberries and raspberries.

Considerably later, in the next century, Kalm (73) says: "The Frenchmen shot a great number of them and gave us some, in which we found great quantity of the seeds of the elm, which evidently demonstrated the care of Providence in supplying them with food; for in May the seeds of the red maple, which abounds here [between Forts Anne and St. Frederic, Lake George region] are ripe, and drop from the trees, and are eaten by the pigeons during that time; afterwards, the seeds of

the elm ripen, which then become their food, till other seeds ripen to feed them."

Another account of early food habits is this: "The Indians, before the European settlements, used every year regularly to burn the woods, the better to kill deer; this practice kept the woods clean, so that the pigeons readily got acorns, which then not being devoured by hogs, were plenty almost everywhere, and induced a return more frequently than now. . . ." (161).

When grain of various kinds was introduced by the colonists the pigeons soon discovered its value as an item of diet. In 1643: "The immediate causes of this scarcity [of food] were the cold and wet summer . . . also the pigeons came in such flocks (above 10,000 in one flock), that beat down, and eat up a very great quantity of all sorts of English grain. . . ." (193).

In the "Jesuit Relation" of 1662-63 (176f) an unknown writer says: "This season they attacked the grain fields, where they made great havoc, after stripping the woods and fields of strawberries and raspberries which grow here everywhere under foot." Peter Kalm (81), later on in the next century, gives an annotated list of food of which a condensation is given:

Maple seeds; elm seeds; mulberries—in Pennsylvania in June; all grain except corn; rye—not popular; wheat—most "coveted"; buckwheat; berries of sour gum tree in Pennsylvania (this grows also in extreme southern Ontario); acorns; beechnuts—in Canada particularly.

This writer then describes a characteristic on which many other authors and observers have commented—that of a liking for salt: "I have also observed that the Pigeons have a special fondness for the kind of soil which is much mixed with common salt; this soil serves them as food, as a spice to blend with the food, or for its medicinal properties—I do not know which. At the Salt springs of Onondaga, in the tribe of the Iroquois Indians, where the soil is so strongly mixed with salt that the ground during a severe drought becomes entirely covered with it and as white as frost, making it impossible for plants to grow, I noticed with astonishment, in the month of August, 1750, how covetous the Pigeons were of this kind of soil."

Even earlier the "Jesuit Relation" for 1656-57 (176e) tells of the "Journey of the Fathers of our Society . . . to the country of the Upper Iroquois, called Onnontoeronnonns" where ". . . in the Spring so great numbers of Pigeons collect around these salt springs, that sometimes as many as seven hundred are caught in the course of one morning." And in our own times "The Canadian Handbook and Tourists' Guide" (160a) says of the Caledonia Springs, Prescott county, Ontario: "It is said the

medicinal properties of these springs were first discovered by pigeons flocking in large quantities to them; and the well known *penchant* of this bird for any salt substance led to an investigation, which resulted in the waters being brought into notice. . . ."

How this trait was turned to the pigeons' detriment will be discussed under Methods of Taking Pigeons.

Food Eaten in Ontario

The following information on the food of the pigeons in Ontario has been compiled from the answers to the Museum questionnaires. Such statements as the "popularity" of a certain article of food are based on the frequency with which it was mentioned.

Food in Spring—Beechnuts—Evidence points to these having been a great favourite and even a staple article of diet in certain localities. In spring last year's nuts were eaten and the fact that these had sometimes sprouted seems to have made no difference.

Acorns—That pigeons ate acorns is a too frequently mentioned fact to be doubted, although they would seem to be a large throatful.

Chestnuts—"Sometimes the spring flights brought birds with crops containing a very small variety of sweet chestnut, said to be chinquapins (not native in Ontario)." (Mr. M. W. Althouse, Toronto.)

Buds—Young tree buds seem to have been a favourite in the spring, and no doubt were often the only edible thing available.

Pigeon berry (*Mitchella repens*) partridge berry or squaw berry. Its name alone would proclaim this an important item. It is strange that it is mentioned as being eaten only in the spring as the berries are ripe toward the end of September. "We had a berry, called Pigeon berry, of which these birds used large quantities. . ." (E. H. Kelcey, Loring, Parry Sound District).

Winter-green berries (*Gaultheria procumbens*)—These are only mentioned by one man, but no doubt many people called any small red berry growing on the ground "pigeon berry" which would include this and other species.

Squirrel corn (*Dicentra canadensis*)—The mention of squirrel corn is interesting because several of our correspondents and other writers have said that pigeons ate roots, but formerly this does not seem to have been proved conclusively. Barrows (15b) thought that when the birds were apparently eating roots they were in reality eating worms and grubs. However, there will be given below, under "Roots", one or two bits of evidence which seem to indicate rather definitely that these were eaten.

Roots—As a confirmation of the root eating habit the following quotations are given. The first are from the diary of Wm. Pope (147),

which concerns western Ontario: In June and July, 1835, pigeons "were generally on the ground seeking a particular kind of plant that chiefly flourishes in these parts of the Forest [small swamps and low flat lands] and the white, crisp roots of which afford them a great part of their substance at this time of the year." June 1, 1836 (?) "In low, swampy places they find a kind of root which serves them for food—it is of a whitish colour and is hot and has much the same flavour as horse-radish." A description which sounds very much like that of the common crinkle-root (*Dentaria diphylla*).

Corroboration from a different locality, the eastern States, is as follows: "This morning I took an excursion accompanied by ———, who wanted to show me the Leek or Pigeon pea, as he calls it. . . . The Pigeon berries or Pigeon peas we could not find, until we returned to the house, where a place was where they commonly grow; in howing up some ground they showed me the roots by which I found them to be, probably nothing else, than the tuberculis of a species of *Glycine*, resembling marrowfat peas very much; the pigeons scratch them up at certain times of the year and feed up on them very greedily" (150). This might have been *Amphicarpa monoica* Linn., which occurs from New Brunswick to Florida, and is variously known as ground-nut, wild bean, ground-, trailing-, or potato-pea.

The pigeon family are not considered to be scratchers, and yet from observation of a captive flock of passenger pigeons (Deane, 56) it was evident that they could on occasion employ this method of seeking food. When fed earth-worms that went down into the soil: "The Pigeons are so fond of these tidbits, they will often pick and scratch holes in their search, large enough to almost hide themselves." If they were capable of such energetic work it is more than probable that they could easily unearth roots which grow as near the surface as those mentioned.

Weed Seeds—The eating of these is mentioned only once in our questionnaires, but they seem a logical thing for pigeons to eat, as mourning doves do so in large quantities.

Grain—A newly sown grain field was a Mecca for pigeons. In the old days when hand seeding was the custom the birds had ample opportunity to feed upon the seed before it could be harrowed in. "I have seen a ten acre field sown with spring wheat covered with pigeons, and I believe they took all." (Col. J. P. Telford, Owen Sound.) "I have heard it said that a man got a small bit of land cleared, and sowed two bushels of peas and went in to dinner, and after dinner he went out to harrow and cultivate to cover them up and there was not a pea to be seen." (John Wagur, London, Ontario.)

There is conflicting evidence as to whether they ate sprouting grain

or not, some saying that they did, some that they never touched it. Since Forbush (71c) says they ate tender shoots of various kinds, I see no reason why they should have excluded sprouting grain. I have found only three recorded instances, none unfortunately from Ontario, other than questionnaire replies. Two are in Armstrong's pamphlet (6), one of which is of a Dan Roy who remembers that pigeons "even pulled up the grain after it had sprouted," and Jesse Wilson tells of them feeding on fall wheat fields: "Even after the grains had sprouted, they pulled up the blades." While in a letter quoted in Mershon (131f), it says: "The birds were pulling wheat badly; other feed was gone."

Summer food—As might be expected, summer diet was more varied, different kinds of berries being most important.

Elm seeds—A favourite article of diet, judging from the number of times they are mentioned in questionnaires. One of our correspondents, the late Mr. F. Kay Reesor of Markham, said that these "nuts" were supposed to give the birds' flesh a strong flavour.

Maple seeds—A staple food.

Pin cherries (*Prunus pennsylvanica*)—These were evidently very popular, judging from the number of people who mention them (see also Clute, page 101). ". . . they also ate large quantities of Cherries, of which we had three or more kinds growing wild." (E. H. Kelcey, Loring, Parry Sound District.)

Elder berries (*Sambucus* spp.)—Both black and red.

Bilberries and *blueberries* (*Vaccinium* spp.), *huckleberries* (*Gaylussacia* spp.)—These various members of the heath family were all eaten in their season. They must have grown in very great profusion in Ontario at one time. Mrs. Trail (181) tells of the abundance of these berries on the "Rice Lake Plains," and we are also told of great huckleberry marshes in Elgin and Welland counties near which pigeons nested.

Blackberries, *raspberries* (*Rubus* spp.); *currants*, *gooseberries*; (*Ribes* spp.), *strawberries* (*Fragaria* sp.)—One of our correspondents says that all "small fruits" were eaten, as they very evidently were. Hutchins' MSS (95), says: "In summer their food is berries, and when these are covered with snow they eat the juniper buds."

Buckwheat—The only grain mentioned as a summer food, although it probably ripens no earlier than other cereals. It has also been said that pigeons did not demolish standing grain, but ate it only from the stook or stubble, but this seems to be a moot point. The quotation from Winthrop (193), (page 96) suggests that they may have done so, in that he says they "beat down" the grain.

Grasshoppers—Grasshoppers are mentioned in one of our questionnaires, and also in Forbush's "Game Birds, Wild Fowl and Shore Birds" (71b).

Grubs—The supposition that grubs were eaten was based on the fact that the birds were often seen feeding on the ground in woods and also on unsown fields. Perhaps in such cases they ate anything that came their way—nuts, seeds, worms or insects.

Autumn food—Beechnuts—Judging from the answers in the questionnaires, beechnuts were eaten more in the spring than in the fall, but this preference is no doubt more seeming than actual. In spring they would be more obviously an item of diet as there were fewer edibles to be had at that season.

White oak acorns (Quercus alba)—It is not possible to state whether other species of acorns were eaten, but it seems unlikely that such a voracious creature as the pigeon would discriminate, except perhaps in the matter of size, as mentioned before.

Mountain ash (Pyrus sp.)—Mentioned in one questionnaire.

Sassafras (Sassafras variifolium)—This is a species confined to southern Ontario, and is reported as being eaten by pigeons only from Essex county: "In the fall, the passenger pigeon was attracted principally for food to the sassafras berries having a deep red colour; the trees furnishing this food were numerous upon the sandy ridges of this section." (Questionnaire, F. H. Conover, Leamington, Ontario.)

Cranberries (Vaccinium sp.)—One mention of cranberries being eaten is from Timiskaming District.

Wheat—As Peter Kalm says, wheat was the most "coveted" of the grains. Many tales are told of the stooks being blue with pigeons. Fall wheat, newly sown, was of course not overlooked.

Buckwheat—This seems to have come next to wheat in order of choice.

Oats, barley—Eaten on occasion. "The first barley grown in East Williams was supposed to have been grown by Donald McQueen from barley taken from crop of wild pigeon." (A Middlesex county report.)

Peas—These were another great favourite. The late Col. T. J. Murphy of London, Ontario, said: "A flock swooped down on my father's pea field one Sunday while he was at church and cleaned it up, about three acres. The peas were ripe and they left nothing but the straw."

Stubble—Stubble fields were well gleaned.

There is only one notable omission from these local lists. Aside from the eating of juniper buds in the Hudson Bay region, no mention is made of evergreen seeds, which are considered important in Forbush's account from the New England States (71b), and by a correspondent of Mershon's (131g). The latter says: "They are a greedy bird and will eat everything from a hemlock seed to an acorn. I have known them to nest on hemlock mast alone in Pennsylvania, and in Michigan on the pine mast after beech mast was gone." Considering the extensive pine forests of early

Ontario and the great northern regions of spruce and hemlock where pigeons undoubtedly occurred, the seeds of these trees must surely have been eaten in large quantities.

The soil and salt eating habit have their Ontario examples. Mr. Alex. Dey of Brownsburg, Quebec, formerly of Grey county, says: "Another habit of theirs was usually on a beaver meadow, there was always a portion of this on which no grass grew, when the water subsided this would become dry. The birds used to get down on this dry portion of the marsh, but what they got there I do not know." And from the same county Mr. S. L. Wright says: "We lived within five minutes' walk of the Saugeen river and when the mills closed the dam for the night the water all ran away for miles down stream so that there was scarcely any water in the bed of the river, and the birds used to come there in hundreds and settle down in the bed of the stream. I think they were after pebbles or gravel and water, as I don't think they will eat little fish."

In Halton county "they gathered around a salt lick in Bridgeman's Bush near Zimmerman." (Mr. C. N. Bastedo, Toronto.)

Additional list of plants from botanical literature

While annotating the above lists it occurred to the author that there might be references in botanical literature to plants or berries named for pigeons and eaten by them, and this proved to be the case. The following list has been compiled from Britton and Brown's *Flora* (31); "Studies of Plant Life in Canada," by Mrs. Trail (181); Clute's "Dictionary of American Plant Names," (47); "The Flora of Canada," by Macoun & Malte, (123); Macoun's "Catalogue of Canadian Plants," (119) and others as cited.

Setaria glauca, foxtail; pigeon grass, (Gray. 79).

Setaria viridis, green foxtail; pigeon grass, ("Weeds of Ontario. 86).

Rubus triflorus, swamp raspberry; pigeon berry, (Clute. 47). Occurs throughout Ontario north to York Factory. (Macoun. 119).

Prunus pennsylvanica, pin cherry; pigeon cherry, (Clute. 47).

Prunus pumila, dwarf cherry; sand cherry. "So eagerly is the fruit sought for by the Pigeons and Partridges that it is difficult to obtain any quantity, even in its most favoured localities." (Mrs. Trail. 181).

Mitchella repens, partridge berry; pigeon berry; pigeon plum, (Clute. 47). Occurs north to Georgian bay region, (Macoun. 119).

Lithosperma arvense, corn gromwell; pigeon weed, (Clute. 47). Occurs in Ontario, ("Weeds of Ontario". 86).

Verbena officinalis, European vervain; pigeon's grass, (Clute. 47). Naturalized from Europe before 1753, (Britton & Brown. 31).

Aralia hispida, bristly sarsaparilla; pigeon berry, (Clute. 47). Occurs throughout Ontario north to Hudson bay, (Macoun. 119).

Aralia spinosa, Hercules' club; pigeon tree, (Clute. 47). The Ontario member of this family is *Aralia racemosa*, American spikenard, a shrub whose berries may well have been eaten by pigeons.

Cornus alternifolia, alternate-leaved cornel; pigeon berry, (Clute 47). Ontario from Ottawa to Lake Superior south, (Macoun. 119).

Cornus canadensis, bunchberry; pigeon berry. The only place where I have found this plant called "pigeon berry" is in "A few Thoughts on the Botanical Geography of Canada," by S. Sturton (167).

Cornus stolonifera, red osier dogwood; "In the latter part of August and early in September of the same year, on the Swan river, above Livingstone, and also on the upper Assiniboine, we saw large flocks of passenger pigeons and as food was scarce we shot large numbers for the pot. The low flats along the river were covered with *Cornus stolonifera* and on the ripe berries of this shrub they were feeding." (J. & J. M. Macoun. 121).

Empetrum nigrum, black crowberry; pigeon berry, (Clute. 47). This berry is also called curlew berry, as well as several other names. It is said to be one of the chief foods of migrating geese in the spring, and is eaten by Eskimo curlew and ptarmigan. Occurs in the Arctic Zone. (M. & M. 123). See page 22 for reference to it being eaten by pigeons in Labrador.

Ilex verticillata, black alder; pigeon berry, (Clute. 47). Mrs. Trail calls this the Canadian holly, and says: ". . . much sought for by the Wild Pigeon and Canadian Partridge." (181).

Vitis aestivalis, summer grape; pigeon grape, (Clute. 47). Confined to southern Ontario, (J. Adams. 1).

Phytolacca decandra, poke-berry; pigeon berry, (Clute. 47). Found in southern Ontario, (Macoun. 119). Neltje Blanchan (24) says: "What a hideous mockery to continue to call this fruit the Pigeon-berry, when the exquisite bird whose favourite food it once was, has been annihilated from this land of liberty by the fowler's net."

Feeding Habits

When feeding on the ground passenger pigeons exhibited a habit which was evidently universal with the species, since mention of it comes from many sources. The flock of birds thus feeding moved with a wide front, those in the rear constantly rising and flying ahead to settle again in the front ranks. Mr. Justice Latchford of Toronto describes this most vividly: "I once saw a large flock feeding in a pea field between me and the sun low but bright. The splendid iridescence of their plumage thus

received a new glory. Every bird was moving, those left in the rear where the gleanings had been gathered, flying over those in front in a constant progression. The vivid colours, flashing wings and rapid and graceful motion combined to produce a scene that is vivid in my memory to-day, after a lapse of more than fifty years."

Mr. Alanson Tanner of Weyland, Michigan, says: "The ground would be blue with pigeons and they constantly flew ahead of the one before them so it looked like blue hoops rolling, or playing leap frog."

According to W. H. Hudson (94), a similar habit is possessed by the military starling of the Argentine pampas: "They are always on the move, the flock presenting an extended front, the beaks and scarlet breasts all turned one way, the hindermost birds continually flying forward and dropping down in or a little in advance of the front line. It is a pretty spectacle, one I was never tired of seeing."

Other birds which feed on the ground in flocks display a similar tendency—snow-birds, sparrows and, naturally enough, domestic pigeons—but it was the passenger pigeon's great numbers that made this such a conspicuous feature among its habits.

Another characteristic of the wild pigeon often noted was its greed. It was a voracious eater, choking down such things as acorns, seemingly too large for its throat, and apparently having no judgment concerning its own capacity. A correspondent says: "I remember shooting two beside a run of water and found their crops vastly filled with elm nuts and to such an extent that one of them was burst open and the food exuding." (Mr. N. Pearson, Aurora.) Perhaps this bird had suffered the same fate as is recounted in the following incident: "Those pigeons were gluttons to eat and after they cleaned up my father's pea field referred to in my report I found some of them dead near their nesting place. What happened was, they filled their crops with dry peas, then flew to the stream near their nesting place and drank water. The dry peas swelled and either burst their crops or choked them. Some of them were not quite dead on Monday, the next day, when I found them, and besides being good food the gluttons saved my powder and shot." (Letter from Col. T. J. Murphy, London, Ontario.)

ECONOMIC STATUS

Destructiveness

It may easily be assumed from the importance of grain in passenger pigeons' diet that they must often have been a decided menace to the farmer. Judging from the quotations already given this was so, and it was particularly true in the days of the early settlements when the year's crop was of such vital importance. It is not difficult to imagine the

hardships which might ensue for the pioneer farmer who had his spring sowing gobbled up by these voracious visitors for in those days seed was not easily obtainable and once lost would be perhaps impossible to replace; or should the birds descend upon his stooks in the fall much precious potential flour would be lost.

This destructiveness continued even when the pigeons were greatly decreased in numbers, for although the birds were fewer and grain fields vastly more numerous, natural food was becoming scarcer in the settled districts, due to clearing of the land and other human activities. Many of our correspondents say that their first remembrance of pigeons is having to keep them off the grain fields. Mr. Althouse of Toronto says: "When I was nine or ten years old I earned my first wages (25c. per diem) by shooting (or shooting at) the flocks of pigeons raiding a neighbour's new-sown fall wheat," and Mr. S. L. Wright of Uxbridge says: ". . . the natural food was grain if it was to be had, and in those days there were no farm implements like we have to-day. The grain was scattered by hand and often half of it not covered as it was usually harrowed in with a home-made harrow, all wood, or else a big branch of a tree dragged over the ground. So of course the birds lived principally around the fields and were very destructive. Sometimes boys had to be kept from school to keep them from destroying crops and when the grain was cut and in shocks I have seen hundreds of shocks so covered that you could see nothing but pigeons."

Other quotations may well be given here, as I think a more vivid picture of conditions is obtained from them than in any other way.

One description is taken from Mr. C. A. Fleming's article in the Owen Sound Sun Times (66): "When wheat was ripe in early August and cut and stooked it was quite interesting to see a flock of a few thousand pigeons circle around over the field and alight on the stooks of wheat. They would entirely cover the grain heads where they were exposed. The farmer was usually alive to the trouble and frequently his gun took toll of the invaders. The grain at that time was put together 12 sheaves to a stook. Ten were set up on their butt ends in the stubble in a double row, and two were spread over them, but towards the middle for a double purpose (1) to shed the rain if wet weather came, and (2) to cover the heads of ten sheaves and only leave two exposed to the pigeons when they came."

Another colourful account has already been quoted (132), but well justifies repetition: "Some settlers blessed the pigeons and were thankful to Providence for such a free gift of food. Others stuffed themselves with pigeon pie and cursed and swore because the poor birds trespassed on their fresh seeded fields, ungrateful, as the Israelites of old were when

they were so bountifully supplied with quail." (Mr. R. B. H. Williams, Petosky, Michigan, formerly of Huron county, Ontario.)

To come from these general descriptions to more definite information, the variability of pigeons' habits is again apparent. From ninety-six replies to this section of the questionnaire the following information is obtainable:

56 answers say that pigeons were destructive to crops.

40 answers say that pigeons were not destructive to crops.

In 13 localities they were said to have been destructive in the fall.

In 7 localities they were said to have been destructive in the spring.

In 17 localities they were said to have been destructive in the spring and fall.

Wheat, buckwheat and peas were the chief crops destroyed.

Sown grain, either that sown in spring or fall wheat, was most coveted. There is no mention of standing grain having been eaten.

On first thoughts it seemed probable that regions in which pigeons were not destructive would be those where there were small nestings or none at all. This is true in eleven cases out of the forty cited, but there are such notable exceptions that no rule could be formulated. From counties such as Grey, Bruce and Huron, where breeding took place in colonies of remarkable size, eleven replies (four from Grey, six from Bruce and one from Huron) say that pigeons were not destructive to crops. Besides this discrepancy the total evidence is much too contradictory for the theory to hold water; as for example other reports from these same counties state quite emphatically that crops were destroyed. A solution of the apparent confusion may be seen in the following quotation, although it deals with another matter: "Pigeons are peculiar, and their habits must be studied by the netter if he would be successful. When they are feeding on beech mast, they often will not touch grain of any kind, and mast must be used for bait." (Wm. Brewster, 30b). This would be the situation particularly in the spring and destructiveness or otherwise would depend on the local natural food supply. Thus birds in the Bruce peninsula, a region famous for its beech forests, might have little interest in grain while the nuts lasted.

In respect to fall crops the solution no doubt lies in the fact that pigeons were an early nesting species, and very often deserted the breeding colony as soon as the young could take care of themselves. These in their turn scattered over the country in roving bands so that by the time grain was ripening it would be a mere matter of chance whether a section of the country would be visited by destructive flocks or not.

Pigeons were an important factor in the destruction of crops, but here is another aspect of the situation which is interesting. In the

Quebec Bulletin des Recherches Historiques for February 1928 there is an article on "Tourtes et Tourtieres" by E.-Z. Massicotte (125). The author says: "Ainsi â Montréal l'intendant Antoine-Denis Raudot signa, le 22 juin 1710, une ordonnance qui defendait à ceux qui allaient à la chasse aux tourtes' d'entrer dans les terres ensemencées de blé, pois et autre grains.

"Le 16 mai, 1748, l'intendant Hocquart defendait de 'chasser les tourtes' sur la terre de J.-B. Hervieux à la Pointe-aux-Trembles, à cause des dommages que l'on causait aux bois et aux semences."

The gist of this is that farmers had to be protected by law from pigeon hunters who were evidently causing as much damage to crops and woods as the birds themselves.

Value as Food

In spite of its admitted destructiveness the passenger pigeon may be justly claimed to have been of considerable economic value. It supplied food; its feathers were of use; it seems to have had a supposed medicinal value; and as a marketable commodity it was in certain localities a source of great revenue. In Ontario its foremost importance was as food.

To the pioneers. Its place in the pioneer's budget has already been indicated (page 21), and the following quotation confirms it. A letter from a Galt settler dated October 16th, 1832, tells of a very dry summer and an August frost killing the crops, and continues: "I must say, that I think we should have half died, if it had not been for the pigeons; we shot 30 of a day; one man shot 55 at 5 times; and he pitched a net and caught 599 at one draw . . ." (64). Not only were they secured by the individual for private use, but as soon as settlements grew up pigeons were for sale in the markets. In 1633 John Josselyn ". . . bought at Boston a dozen of Pidgeons ready pull'd and garbidge'd for three pence" (98). While in Canada during the early years of the last century: "In spring the markets [at Quebec] are abundantly supplied with wild pigeons, which are sometimes sold much lower than the price I have mentioned: [1s. 6d. to 4s. per dozen] this happens in plentiful seasons" (105).

To the Indians. Indians, before the white man came, knew their value. They netted them, as will be described later, and Alexander Wilson (191) says: "These [squabs] are so extremely fat that the Indians and many of the whites, are accustomed to melt down the fat for domestic purposes as a substitute for butter and lard."

"You may find several Indian towns of not above seventeen houses that have more than one hundred gallons of pigeon's oil or fat." (John Lawson, 109.)

In the refuse heaps of a prehistoric village site in Oxford county, Ontario, passenger pigeon bones were dominant among the bird remains (192).

Methods of Preparation

Pigeons were prepared for the table in various ways. Mrs. Traill's recipe for pot pie has already been given, and this type of pie seems to have been the most common method of cooking them. In fact the old ditty goes:

When I can shoot my rifle clear
At pigeons in the sky,
I'll say good-bye to pork and beans
And live on pigeon pie.

Dr. R. H. Arthur of Sudbury says in reply to the question, "In what ways were they prepared for the table?"—"Nearly always as a pot pie, with lots of light pastry or dumplings, and a piece of fat pork (not fresh) to make gravy, as the pigeon breasts were very dry." Another in answering the same question, writes: "Pot pie, yum-yum!"

They were also roasted, stewed, fried and made into soup. Young squabs were fried in their own fat. When the birds were plentiful the breasts only were used, and were prepared in various ways, sometimes fried in deep fat. Another method was to roll them in clay and bake them. "Hunters and maple sugar makers often cooked adult pigeons by roughly drawing and then enclosing the unplucked carcass in wet clay which was then covered with the embers and hot wood ashes.

"When cooked the meat was removed from the covering of baked clay which kept with it all the feathers and most of the skin of the bird." (Mr. M. W. Althouse, Toronto.)

Mr. Althouse supplied a very full account on all topics, and I will quote from him again on the subject of food. In answer to the question, "In what ways were they prepared for the table?" he replied: "(a) stewed or fried, (b) salted and kept in brine for winter use, (c) salted (breasts and thighs), smoked, and dried for winter use, (d) parboiled, and made into pigeon-pie, a popular use for spring pigeons which were not so tender as squabs."

Salting for winter use was mentioned in the "Jesuit Relations" of 1662-63 (176f): "But when the Pigeons were taken in requital they were made to pay the cost very heavily; for the Farmers, besides having plenty of them for home use, and giving them to their servants, and even to their dogs and pigs, salted caskfulls of them for the winter."

Mr. N. Pearson of Aurora describes another method: "My grand-

mother was the first white woman to settle north of the Ridges [Oak Ridges, York county], and she told me about the way she prepared the pigeons. She had three sons and they rigged a net to capture the birds and they caught them by the score and fifties. She plucked and opened them and laid them in a mild pickle for a day or two. She had a large fire place with two cranes (stoves were not invented) and she hung the birds in the chimney in the smoke for a time and then packed them in tubs and barrels for future use. This was before cattle, pigs and sheep were common, and their meat was venison, fish and partridge, and the pigeons were good food."

It was stated in one reply that pigeons were usually cooked in a "dutch oven" as stoves were scarce. Mr. C. E. Corfe of the Museum staff tells me that his mother had one of these in England. He says it was a triangular affair made of tin, having two long sides in which were flaps which lifted up. It was placed before the fire and the flap on that side raised. When the contents were done on one side the oven was reversed, and the other flap raised. Another type was cowl-shaped, with an open face and a small spit inside, and hooks by which it was fastened to the fender.

Use of Feathers

Pigeons' feathers were used to a certain extent for beds and pillows, and an American named Holt who netted pigeons in Victoria county, as a business, used to ship feathers out from that district. (Alex. Morrison, Kinmount, Ontario.) But Mr. Althouse says that the birds were more usually skinned than plucked. However, a French author writes: "Tout paysan avait alors la tourte au pot, et nulle fille de ce temps ne se mariait sans apporter en dot un lit de plume et des oreillers aussi, ce beau temps n'est plus, mais . . . on se marie toujours" (133). Wm. Pope (147) says: "The feathers of the breast are very good for stuffing beds."

In this connection the following superstition is interesting: "There was a woman I knew, she lived in Markham township. On her dying bed, they had to remove feather bed from under her, as she would not die on pigeon feathers." (Wm. Metcalf, Ravenna, Ontario.)

Medicinal Uses

As far as I have ascertained there are only two instances of these birds being used in any way for medicinal purposes; the first being mentioned in a questionnaire: "The gizzards dried and powdered were steeped and taken, an old-fashioned but reliable cure for vomiting stomach." (A. O. Garrison, Plainfield, Ontario); and the second being

from an article on the passenger pigeon in folk lore (108): "An old woman, part Indian, used to save the gizzard (*gesier*) when the pigeons were prepared for market, and would string them on a thread and hang them up to dry. The gizzards when dry became shiny and transparent and were used by this old woman, in the treatment of gallstones. The reasoning was as follows: the *tourte* would sometimes take up small stones (*gravois*, pronounced *grawa*) instead of grain, but that did not matter as its gizzard was strong enough to dissolve the stones. Therefore when the gizzard came in contact with the gallstones it would dissolve them too and cure the patient. My informant did not make it clear how the remedy was taken, but it is certain that it was taken internally as the gizzard had to come in contact with the stone."

In China there is another aspect of the pigeon, as a species, being favourable to health. Jade handles for walking sticks are sometimes carved in the form of a pigeon's head, and the gift of such a cane to an old man implies the wish for continued good health, since the birds are supposed to possess special powers of digestion (65).

Marketing of Pigeons

Anyone wishing to know something of the scope and value of the pigeon trade should read Mershon's book (131). He devotes several chapters to the subject and many of the figures quoted are truly astonishing. Pigeon hunting as a business came into existence about 1850, and at one time there were said to be five thousand professional pigeoners operating in the United States, and it was possible for the individual to make from \$10.00 to \$40.00 a day in the height of the season which was during breeding, a period lasting from March to July. The devastating effects of this trade upon the species will be discussed in the section dealing with extermination.

In Ontario

Canadians seem to have lagged behind their more enterprising neighbours, and there is no evidence of trade in pigeons which in any way approaches the proportions reached farther south. There are no doubt reasons for this which are not altogether based on lack of enterprise. Canada has developed slowly, and it is surprising to realize that pioneer conditions existed very largely until the last quarter of the past century. Until then men were still engaged in practical constructive work, making profitable farms out of clearings, and towns from tiny villages. The situation is summed up in the remark of a Manitoulin Island correspondent who said that pigeons "came at a time when there was something else to do than disturb game." The attitude was probably typical of the

whole country concerning the commercial possibilities of the game resources, and it certainly applies in rural Ontario with regard to marketing of pigeons as a business. The birds were of course killed in great numbers for food and sport in this province, but there seem to have been few instances of organized slaughter and sale. Mr. C. A. Fleming of Owen Sound says: "I never knew of them being sold. Every person had his old muzzle loading shot gun and could get a supply any time. People who shot more than they needed supplied their neighbours;" or, as in Frontenac county: "Occasionally a boy would sell a few to buy ammunition. I never knew them to bring more than 25c. a pair." Near the larger towns and cities, however, advantage was taken of the markets, and a considerable trade was carried on, some even shipping out of the country to Buffalo, Detroit and other border towns.

To quote Mr. Althouse once more with reference to Middlesex county: "... we got *bushels* of them in summer and early fall, both by shooting and netting. Early in September and sometimes in late August people used to go to the roosting places in 'second-growth' pines with torches and long poles, and kill hundreds of fat young birds. Buffalo was our market, and shot pigeons were worth five cents each, and netted ones brought five-and-a-half or six cents a piece. We usually hung the birds in small lots of two or three over night, to cool off, and packed them in layers of straw in apple-barrels, and sent them, I think by express, consignee to pay all charges. My father's net sometimes furnished three or four barrels in a single day. If I remember correctly a barrel held about 100 or 120 birds. Sometimes the netting season lasted two or three weeks. When the visible supply diminished it would not pay to have two persons attending a net. We never heard it was illegal to net. The birds were a nuisance to the farmers, a menace to the next year's crop of wheat, and in some instances destructive to spring wheat then standing in stook."

A considerable business must have been done in the county, as Col. T. J. Murphy, living at that time in the region of Staffa in Perth, said: "South of where I lived they were shipped in car loads to Buffalo and New York." Detroit would seem the logical market for these birds, but no doubt was glutted with Michigan birds, which must have been the case since pickled squab breasts were sent from even Lambton county to Buffalo.

Simcoe, York, Lincoln and Welland counties were the other centres of the industry. A letter from Mr. Chas. Hebner of Orillia says: "I can distinctly remember the days when the passenger pigeon used to come and roost in the woods between the Nottawasaga and Pine rivers. That was just sixty years ago and I was then a boy of seven or eight years of

age. They came in vast numbers for two or three years and then the numbers began to diminish until they disappeared altogether when I was about fifteen. The men who made a practice of marketing pigeons used to get us boys to climb up into the small trees, in which they were roosting at night, and knock them down with sticks. A blow on the head with a stick two feet or more in length would bring the pigeon to the ground. The birds were thrown into the barrels and shipped to Toronto and Montreal where I understood they were canned. The man for whom I used to work shipped as many as sixteen barrels in one day containing about 100 birds apiece. Sometimes the birds were not dead when the canvas cover was put on the barrel. The trees were small and this was one reason why boys were used to climb them. We used to be paid a cent a piece for all we killed, and I have made as much as \$3 in one night even though I was only a boy."

In Toronto: "They were marketed . . . at different places. Big bunches were handled in St. Lawrence market." (J. C. Fretz, Vineland.) They were also sold to game dealers and hotel keepers, the usual price being ten cents each, or a dollar a dozen.

Mr. J. M. Beamer, of Fenwick, remembers a family named Wylie who lived near Port Dalhousie and used to trap and net birds for the American market, by the thousands. In St. Catharines market they were sold, some being brought in and sold alive to be kept in pens until wanted. These birds brought from five dollars to ten dollars a hundred. (R. T. Nichol, now of New York.)

In Welland county in the Bobtown locality, a Mr. Eastman used to catch thousands with stool pigeon and net, to be sold in Thorold town at ten cents a pair. (Geo. A. Phillips, Welland.)

The fact that more organized hunting was not done in Bruce, Grey and Huron was no doubt due to their inaccessibility by rail. Many thousands of birds were killed there, and some were shipped out, as Mr. John Shaw of Thornbury in Grey says that: "People used to take them to Toronto, (100 miles). Price unknown." And in Huron great loads of birds were carted away from the nestings, but no one seems to know where they were taken nor what was done with them. In Bruce: "Some were for sale, but I cannot remember the price," says P. J. Scott of Southampton.

Professional pigeoners came occasionally to Canada from the United States. It has been told in another connection how Mr. Osborn of Alma, Michigan, came to a nesting "near Georgian bay" (131e), (Nesting Table, page 37). In Victoria county, Mr. Alex Morrison says: "It appeared to me that there was no close season for the wild pigeon as an old Yankee named Holt netted them all summer near our farm and I shot pigeons

on his feeding grounds, as I considered I had as much right to shoot a few birds as he had to trap hundreds. Holt shipped some alive in crates and others he killed and sent to the city markets dressed."

Prices in Canada seem to have been much the same as in the United States. In this country according to questionnaire replies they ranged from five cents a piece to twenty-five cents a pair, and from five dollars to ten dollars a hundred. In the United States: "The prices of dead birds range from thirty-five cents to forty cents per dozen at the nesting. In Chicago markets fifty to sixty cents. In fashionable restaurants they are served as a delicious tid-bit at fancy prices. Live birds are worth at the trapper's net forty cents to sixty cents per dozen; in cities \$1 to \$2" (131c).

I think the fact that prices quoted in the United States are always on a large scale, *i.e.*, for dozens, hundreds, barrellfuls; whereas in Ontario they are mostly for single birds or pairs, is an indication of the difference in scale and importance of marketing in the two countries.

SPORT

From the sportsman's viewpoint wild pigeons were fine game. A bright October day with a hint of frost in the air, a good old muzzle loader in hand, and pigeons flying and what more could man's heart desire? The bird's swiftness on the wing and its rolling, twisting flight made it no easy target and considerable skill was needed to bring down an individual. It was said to be useless to fire at a bird coming toward you, as the shot would glance off its very thickly feathered breast, so that it was best to wait until it was just by you before shooting.

The time spent in recharging a muzzle loader must have been an aggravation with birds coming so thick and fast, and the difficulty was sometimes overcome in the following way: "It was said that the Oxley brothers, who were Englishmen and true sportsmen, did not fire into the flock, but each singled out his bird so as to avoid wounding indiscriminately. Breech loading fowling pieces were not common at that time, so some person loaded the guns, and expert shots did nothing but shoot." (A. W. Reavely, Ridgeway, Ontario, concerning Welland county, Thorold township.) Everyone of course was not so expert, and many and varied were the means used to get pigeons—from bow and arrow to stool pigeon and net—but to everyone, no matter what his methods, pigeon catching was great sport. As one of our correspondents says: "Oh my, how we boys who loved shooting looked forward to spring and the flight of the Pigeon. Guess there was some stealing out of the guns and playing hookey instead of school for the sugar bush—and a good drink of sap after brushing away the leaves from the old wooden trough."

In this sport of pigeon shooting the Indians evidently excelled, using their native bows and arrows rather than guns, for in a letter in "Forest and Stream" (5) a correspondent says: "Perhaps there is nothing that will draw out a whole tribe of Indians, old and young, like a pigeon hatchery. . . . Here were gathered at different points most of the natives, old and young, from three or four tribes of Indians. Here the best archers from the Buffalo, Cattaraugus, and Alleghany reservations had met for a trial of skill. I am not well posted in the scores of modern times, but it was then and there that I say greater feats in archery than I ever witnessed before or since." This refers to a nesting of pigeons in western New York State in 1823 that covered 180 square miles.

Trap-shooting

One purpose for which pigeons were procured in large numbers was trap-shooting—and of all forms of so-called sport surely this is one of the lowest. It is one thing to hunt a creature in woods or field where it has equal chances of escape, but it is quite another to capture it, confine it, and then release it to be shot in its first ecstasy of freedom.

HAWE'S PIGEON TRAP.

PRINCIPLE IS NEW,
SIMPLE AND
EFFECTIVE.

Made
of
Galvanized Iron.

THIS TRAP IS PLACED IN THE GROUND, the top level with the surface. When the cord is pulled one-half of the lid revolves within the Trap and **DRIVES THE BIRD INTO THE AIR**. Sportsmen will at once appreciate the advantages. Price \$4.

Agents: HARTLEY & GRAHAM, New York.

An advertisement appearing in "Forest and Stream" in 1880.

The details of the performance consist in the releasing of birds from traps, usually five in number, placed on the ground in a semi-circle around the marksman. The traps were sprung by means of a complicated system of cords and cogs so that it was impossible to tell from which

one the bird would come. Rules of considerable number and diversity grew up as they do about any simple game, and these may be found in the constitutions and rules of the various gun clubs of the time.

The history of the sport seems rather obscure, but apparently it originated in England, about 1790, where the Hurlingham and National Gun Clubs were its two famous supporters. Monaco was also a great centre, and international tourneys were held there, and still are, I believe. The first American club was formed in Cincinnati, Ohio, in 1825, and from then on the sport gained in popularity until the country was swarming with small and large shooting clubs. For many years live birds were used, the Blue Rock being the common species in England, while in America wild birds seem to have been most in demand, although glass balls were used to some extent and finally "clay birds" were invented, and are commonly used to-day. This latter change was brought about by legislation backed by public opinion against the cruelty of using live birds.

In America the sport has a history that is interesting although unpleasant in many ways. It seems to have become a mania toward the end of the last century, and the pages of such magazines as "Forest and Stream" are full of shooting match scores and accounts of tournaments which have a full flavour of the "good old times"—"The club members and friends left their elegant rooms at Harry Miner's in carriages about noon, with all the conveniences for a good afternoon's sport. . . . At the close of the contest a bountiful collation was partaken of at the hotel," says this magazine concerning a Long Island event.

Such friendly affairs were no doubt very harmless and pleasant, aside from the pigeons destroyed, but as so often happens, gambling and professionalism crept in with demoralizing effects. Large prizes of money were contested for, and in the case of professional shooters, the gate receipts were divided between the contestants. The following is interesting in this connection:

"A challenge Accepted—Brooklyn, April 20, 1880. Editor Forest and Stream:—I notice Captain A. H. Bogardus issued a challenge to any man in America a short time since, previous to his going to England, in which he allows any man that accepts, to name the match, and he would wager two to one. I therefore accept his challenge and name the stakes \$500 to his \$1,000 for the following pigeon match: Fifty pairs, double risers, Long Island rules to govern; with the exception of find and trap for each other, or find substitutes. Match to take place at the Brooklyn Driving Park any time mutually agreed upon within one month from date. I have this day deposited with E. H. Madison, 564 Fulton Street, the sum of \$100. Wm. King."

Great cruelty was often displayed in the treatment of the birds. Should they not be sufficiently lively, a patch of feathers would be torn off their backs and essence, or oil, of cayenne put on the raw flesh, or pins would be stuck in their bodies, or adhesive plaster would be put over one eye so that they would fly in the desired direction.

Naturally great numbers of birds were used, and although a defender of the sport maintained that ninety per cent. were tame birds raised for the purpose (not that this in any way lessened the cruelty) in reading through old accounts it is obvious that wild ones were preferred. Some idea of these numbers and also of the various opinions which gradually took shape concerning the sport are found in letters in "Forest and Stream" for 1880. In the issue for April 22nd is the following:

"Editor Forest and Stream:—

"In a March, 1880, issue of Forest and Stream, picked up at random, which number, by the way, chronicles a comparatively light week for trap-shooting, I figure as follows, under the head of 'Shooting Matches':

Whole number of pigeons shot at..... 1,209

Whole number of pigeons killed..... 859

Whole number of pigeons missed..... 350

"At the head of some of the scores I notice 'Birds very wild'; 'High wind prevailing'; 'Cold, drizzling rain,' etc., which goes to show that March is not *par excellence* the trap-shooter's month; so it is hardly fair to multiply the results of the week by fifty-two, and call the product a just aggregate of a year at the traps. However, for the sake of argument, let us strike a balance:—

Whole number of pigeons shot at..... 62,868

Whole number of pigeons killed..... 44,668

Whole number of pigeons missed..... 18,200

"Quite startling; and Forest and Stream quotes only a small percent of the matches going forward. . . .

". . . Are gentlemen doing right in encouraging the netting of these birds, by offering fancy prices for them? Is this doubtful industry of any practical good to the nation or individuals? On the whole, is not the netting of pigeons and their slaughter at the trap cruel, unmanly and unsportsmanlike?

"But a few years ago wild pigeons were abundant, and plenty of really exciting sport could be had in pursuing them. Now, owing to the sudden and reprehensible mania for trap-shooting that has taken possession of our sportsmen, they are like the Messina quail, very scarce. Constantly pursued, they are melting away, and soon will be only known to natural history as an extinct species, and another generation, in traversing the corridors of the Smithsonian, will crowd about a single

specimen of *Ectopistes migratorius* (if haply one be left by the trapshooters for this purpose) and say: 'Behold the bird our fathers sacrificed to a relic of barbarism called trap-shooting.' . . . H. W. De L."

On April 29th a reply to the foregoing letter says in part: "His fear that trap-shooting will deplete the number of wild birds is also, I think, without foundation, because the opportunity to catch them is limited to two months of the year, and they are too delicate to stand much transportation or handling. Without doubt they are caught in great numbers for the market, but the proportion that run the gauntlet of the traps is small, as 90 per cent of birds killed in pigeon shooting are domestic. Knowles."

Again in the May 27th number: "De L. errs in ascribing to trap-shooting the decrease in birds. The suggestion that there is any decrease in the annual flight of wild pigeons is absurd; their fecundity is marvellous; it seems as if they were created by a kind Providence especially for the demand. . . .

"Any apprehension, I think, of the perpetuity of the wild pigeon being limited or affected by trap-shooting is groundless. The only fear is that each year the roosts being farther from us, it costs more to get them here. Our State shoots will have to find some substitute. What shall it be?—En Garde."

Other notes in "Forest and Stream" for the same year tell of the annual "conventions". Under the date of April 15th: "The Seneca Gun Club—Seneca Falls, N.Y. . . . The club is in a prosperous condition, and the managers are actively engaged with matters pertaining to the Convention. The Bird Committee are in correspondence with different parties in regard to pigeons, but in my judgment the contract will be given to either Phillips of Detroit [whose business is described in Mershon's book (131d)], or Stagg of Chicago, both reliable dealers, who would furnish good birds."

But neither Phillips nor Stagg got the contract: "The State Convention—Messrs. Parrish and Williams, of the Seneca Gun Club, Seneca Falls, have contracted with Frank Chaffey for the immediate delivery of 12,000 wild pigeons to be used at the coming tournament. One thousand birds have been shipped to the Monroe County Club, and will arrive this week. The Rochester Gun Club and several clubs in that vicinity have also ordered birds of Mr. Chaffey for practice.

"Monday, May 24th, has been appointed as the date for the opening of the Convention."

There was already a movement against this sport; pigeon shooting was not allowed in New Hampshire, while in February, 1880, Rhode Island passed a bill prohibiting the same thing in that state. And in this

same year an event occurred which seems to have been the beginning of the end of live bird shooting. For the week beginning May 24th, as intimated in the letters already quoted, at Seneca Falls, New York, was held the twenty-second annual convention of the New York State Association for the Protection of Fish and Game, and during the whole week conservation does not seem to have been even mentioned, but a great shooting match went on when the twelve thousand pigeons ordered from Mr. Chaffey, were shot at and no doubt mostly killed. This affair created a storm of protest, as may well be imagined, and called forth many interesting letters, some of which may be read in "Forest and Stream" for that year. However, the flurry seems to have died down, since the same thing, on an even larger scale, occurred the following year. This meet was held at Coney Island and twenty thousand birds were slaughtered, with the immediate result that a law was passed in New York State prohibiting shooting at "any live pigeon, fowl, or other bird or animal" as a target, or for amusement, or as a test of marksmanship—but adding: "Nothing herein contained shall apply to the shooting of any wild game in its wild state." This was a step in the right direction, particularly considering the influential position of New York State in the Union, but it was another twenty years before the use of live birds was abolished over the whole country.

Trap-shooting in Canada

In Canada the trap-shooting mania seems to have been of a somewhat less virulent type. According to Mr. John Townson it was a fairly common sport in Ontario, but scarcity of money prevented its being carried on in a large way as it was in the United States. The Toronto Gun Club, formed in 1871, was the only organization that could afford to buy wild birds for its shooting matches, and evidently this was more a matter of "good form" than of better sport, as Mr. Townson says that domestic pigeons were much harder to shoot, being in so much better condition than wild ones that had passed through the vicissitudes of being trapped and then confined for shipping.

The Toronto Gun Club got its birds mostly from Buffalo, and they were sent across the lake by boat in crates containing about fifty individuals. These were obtained usually only in April, during a period of about three weeks, while the spring migration was on. The Club would use perhaps an average of four hundred birds in a day and a match would usually last three days. A record attendance at a tournament would be about fifty-five, while the usual number was about thirty. In the fall when the annual tournament was held, domestic birds would be used, as at that season it did not pay to net wild ones for this purpose. (Cf.

Mr. Althouse's report of netting in Oxford county, page 110—this being an instance of the local variability of pigeons).

Mr. William Loane of Toronto, who made his living by hunting and trapping, and who had the contract for supplying the Queen's Hotel with game, used to net pigeons north of Toronto for trap-shooting. His methods will be found under "Netting".

Grand Pigeon Match,

At the Golden Lion Inn, Yonge-Street.

A Grand Pigeon SHOOTING MATCH

Will take place at *Sheppard's Inn*, as above, on WEDNESDAY, 26th of SEPTEMBER, instant. Upwards of Three Hundred Pidgeons are provided for the occasion, and it is purposed to give Three Prizes as follows :

For the Best Shot, a Prize of £10.—Second best do. £5.—Third do. do.—a Good Rifle !!!

☞ Shooting to commence at 11 o'Clock, before which Hour the Gentlemen wishing to participate in the Sport, will be required to enter their names, and to comply with such Regulations for the government of the Sport, as may be arranged amongst themselves after their arrival.

Dinner will be on the Table at 4 o'Clock.

YORK, 16th Sept. 1833.

[G. P. Bull, Printer, "Courier" Office, Market-House, York.]

The original of this advertisement has been loaned to the Royal Ontario Museum of Zoology by Professor E. W. Banting of the University of Toronto, and is reproduced here with his permission.

METHODS OF TAKING PIGEONS

Before embarking on the more than complex subject of extermination it might be well to give some idea of the various ways in which pigeons were caught, or killed—the mechanical details of the greatest contributing factor of their extermination.

Early References

Indians used nets as well as bows and arrows to take the birds, but whether the use of the former was learned from the white man is perhaps a matter of conjecture. Pierre Boucher (134) says: "There are birds of another kind called wild pigeons. . . . There are prodigious numbers of them . . . they are to be found everywhere in this country. The Iroquois take them in nets as they fly, sometimes by three hundred or four hundred at a time." Peter Kalm (81) says: "The Savages in Onondaga had built their huts on the sides of this salt field, and here they had erected sloping nets with a cord attachment leading to the huts where they were sitting: when the Pigeons arrived in Swarms to eat of this salty soil, the Savages pulled the cords, enclosing them in the net, and thus secured the entire flock."

These two accounts sound rather as though the Indians originated the idea—but the English took them in nets about 1660, and had done so for some time previously according to Josselyn (98).

There are in early literature other references to pigeon catching which show it to have been an opportunity soon seized upon, as has indeed been obvious already in other connections. Quotations from the "Jesuit Relations" have been given previously and a narrative (176g), in this collection, of the Mission of Saint Joseph at Goigonen says: "Many snares are set there for catching pigeons, from seven to eight hundred being often taken at once."

Guns of course were the most usual method employed, but I do not imagine that the following incident was of very common occurrence. It is taken from a "Narrative of a voyage to, and travels in, Upper Canada," by James Taylor, 1846 (171): "Rock pigeons are sometimes very numerous in Canada. In the spring of the year, myriads of those dove-like visitors may be seen flying in the air. One of those prodigious flights came over Lake Ontario, in a direction for one of the garrisons, which being observed by the soldiers, a cannon was loaded with grape shot, and when the pigeons came within range, the contents were discharged amongst them, and made very great slaughter; hundreds of them fell into the lake, and furnished plentiful picking for their pursuers, who pulled off in their boats from the shore to gather them."

One or two other quotations are *à propos* before going into details as given in questionnaires. "A Backwoodsman," Dr. Dunlop, (57), writing about 1832, tells of events at Toronto, then York; the infringement of the law which is mentioned being evidently the fact of shooting within the town limits, as game was in no way protected in those days. "Every person who has been in America has described the interminable flocks of wild pigeons; so I shall not trouble my reader on that score. Some two summers ago, a stream of them took it into their heads to fly over York; and for three or four days the town resounded with one continuous roll of firing, as if a skirmish were going on in the streets—every gun, pistol, musket, blunderbuss and fire-arm of whatever description, was put in requisition. The constable and police magistrate were on the alert, and offenders without number were *pulled up*—among whom were honourable members of the executive and legislative councils, crown lawyers, respectable, staid citizens, and, last of all, the sheriff of the county; till at last it was found that pigeons, flying within easy shot, were a temptation too strong for human virtue to withstand;—and so the contest was given up, and a sporting jubilee proclaimed to all and sundry."

Robert Crichton says in "Impressions of Owen Sound in 1851" (50): "For two or three seasons wild pigeons were very numerous, especially in 1853 and 1854. The sportsmen used to range themselves along the edge of the hill, and in the morning the shooting seemed like infantry practice, as the pigeons flew over the village from their nesting places on the hills to the westward. I remember the pigeons so numerous that they almost darkened the sun with the immense flocks. Large rookeries of them were in the neighbourhood, and they supplied the family pot of many an early settler. It is one of the strange things of nature that they have all disappeared."

According to local information that we have received, the methods used in Ontario were many and varied, ranging from a boy's most primitive bow and arrow to a complicated netting system, complete with bough-house and stool pigeons.

Bow and Arrows

Arrows were used very rarely, judging from questionnaire replies—only five answers saying that they were. One from the Timiskaming district states that they were used there to save ammunition, as guns were used only when the hunter was sure of getting five or more birds at a shot. (Mr. Joe Moore, Wawaitin Falls.) Mr. Fleming of Owen Sound describes his method of making bow and arrows (66): "We would select some nice straight cedar split into pieces about an inch square,

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WINTER SPORTS IN NORTHERN LOUISIANA: SHOOTING WILD PIGEONS.—SKETCHED BY SMITH BENNETT.

This picture of pigeon shooting was discovered by Paul Hahn in a small barber shop in Toronto

and say eighteen inches long. A nail would be driven into one end of each piece, all the heads ground off and brought to a sharp point on the grind stone. Then arrows would be shaped out of these pieces of cedar, perhaps twenty-five or thirty to be ready for business when the pigeons came. A piece of straight grained rock elm would be found about four feet long and split and shaped up to make the splendid bows with which to shoot our arrows.

"Selecting a suitable spot where flocks often passed we would shoot the arrows into the flocks. If the sharp pointed arrow hit a bird, it was 'our meat.' The arrow would stick and bring it down—that is when we managed to make a strike—of course there were so many air holes through the flocks, that if one out of a dozen arrows brought a bird it was considered extra good luck."

Shooting

Shooting pigeons with a gun was evidently the commonest way of procuring them in this province. One hundred and ten replies give this as the method used in the writer's locality. All kinds of guns were used from the cannon to the pistol, judging from our various sources of information; and shooting in times past was not the simple affair of to-day. Guns were muzzle loading and were by no means the mechanically perfect modern products—nor was the gun itself the only problem:—"Carried our shot and powder in flasks for powder, cows' horns for shot." (Alfred Lamb, Constable, Ontario.)

Great tales are told of record shots and the numbers they brought down, but some I am afraid need to be taken with the proverbial pinch of salt to be at all digestible. As already told in a "Jesuit Relation" (176f) one man in the good season of 1662 accounted for one hundred and thirty-two at a single shot. Another Frenchman at a much later date is said to have secured ninety-nine with one discharge of his gun, and when asked why not a hundred he replied that he certainly would not lie for the sake of one small pigeon. Others tell more plausibly of thirty-nine or forty at a shot (this being the record for Walpole township, Haldimand county), or twenty-five, or eight killed and six wounded, while a Prescott county man once fired a shot and they gathered up of the pigeon fragments two pailfuls.

As an example of youthful prowess Mr. N. Pearson of Aurora tells: "My leisure on Saturday was my own time for the pigeons, and I went out nearly a mile one day at about 10.30 and came in before noon with twenty-four. Not much of a bag, but for a boy not ten years old it was satisfaction." And this is how he did it: "I lit on a field of pea stubble and had a small beech for a foreground with a thorn in the pease patch,

and in a very little time the birds appeared and in the first shot there fell eighteen which I picked up and retired to the beech tree, and looking up I saw two birds in proximity and I let off my gun, and instead of two down came six which I had not seen."

Another account is in Mr. C. A. Fleming's newspaper article (66): "Arriving at the age of ten years the old single barrel shot gun was available after careful instruction as to how to load it, fire it and care for it, and a few lessons as to how, where and when to shoot. It was no use to fire at a flock when coming toward you. The shot would glance off those thickly feathered, highly polished breasts, and you would scarcely ever see one fall—but just turn around and get them when they were going away from you, and you would get your birds from one to half a dozen at a shot.

"Another way was to get them after they lit on the top rail of a zig-zag fence. A neighbour bought a new gun. A very nice patent breech gun with a highly polished walnut stock, the finest in the settlement. He would be out early in the morning to get a shot at the pigeons that would light on the rail fences, but he never could get more than one bird at a shot. Before this he would often be given three or four by some of us boys when we had taken from six to a dozen at a shot from the top of a fence before he got his new shooting iron.

"One fine morning he seemed anxious to trade his new one for my old weather-worn plug breech gun that cost \$3.50 when new. I knew my father would not allow any trade of that kind, so I picked up his gun, loaded it from his powder and shot flasks and waited my chance. Presently a flock lit on the fence within easy range. I moved away a little to get my position, and fired and handed him his gun and eleven birds. He had been getting in a line with the rail on which they perched, and of course only got the end bird, but taking them on the angle it was easy enough to strip off the whole line."

Telling of a Bruce county colony, the "Paisley Advocate" said (152): "The place is visited by scores of persons who are shooting the pigeons, and all the shot in Owen Sound and Southampton seems to have been fired away as a telegram has been received in Paisley asking for a supply."

Even worse than having no shot was the predicament of Alexander Dingwall Fordyce of Fergus, who said writing to his father in June, 1835 (196): ". . . at this season there is no difficulty in getting a dinner of pigeons, of which there are great Flocks, but I have not yet got spectacles so I might as well have no gun."

Mr. Townson tells of pigeon shooting in Toronto in the early days: "It might be explained that shooting on Sunday in those days was not uncommon, especially when the pigeons were flying. Also at that time

there was a large tract of open ground extending from St. James Cemetery over to the end of Bloor Street, where the old blockhouse stood on the crest of the ravine where the Sherbourne Street bridge is now located. This open stretch of ground was a favourite place for the local gunners to wait for the pigeons as they lowered down after passing over the city, and for many years was known as 'Pigeon Green'."

Netting

Although the commonest method of taking pigeons in the province was by use of the gun, the net was employed to a considerable extent, and evidently in several different ways. Mr. Althouse gives a good description of one of them:

"(a) *a net* with a mesh about three inches stretched diagonally. This net would be fully 100 feet long and about 40 feet wide. One edge was pegged down with crotched twigs, while the opposite edge was lightly leaded, and folded back on top of the pegged edge.

"(b) *A pair of strong spring-poles*, set to throw the free edge of the net over the

"(c) *prepared bait-bed*, covered with chaff or cut straw among which a plentiful supply of shrunken wheat or pease was scattered.

"(d) *A stool-pigeon*, securely tied to a tilting stick or board, so that when the heavy end was lifted by the trapper, the bird would flutter. We used a 'winged' pigeon for a starter stool-pigeon; but took a fresh one from succeeding catches.

"Feeding flocks flying near saw the stool-pigeon apparently lighting to feed, and followed suit.

"Often the baited space would be left un-netted for a day or two until fresh flocks got used to feeding there.

"When the net was sprung most of the pigeons upon the baited area would be caught, and as the meshes were large enough to allow *heads and necks* to come through, but no more, very few struggled clear.

"The approved method of killing the catch was by *biting* the head just back of the eyes. It was not necessary to break the skin, the crushing of the base of the skull killing the birds instantly.

"Some people closed the eyes of the stool-pigeon by stitching the eyelids with a fine silk thread; but my father regarded this as a needless cruelty. The stool-pigeons usually became pretty tame in a week or so, and generally ate pease freely after the second day of captivity."

Mr. Townson described to me the method used by Mr. Loane at Toronto, which was practically the same as that described above, and directed the drawing of the accompanying sketch as illustration.

The net was attached to the poles by heavy iron rings which by their own weight, added to that of weights along the front edge of the net, slipped instantly down the poles to the ground when these were released by pulling a cord which ran to a nearby hide. About 1873 Mr. Loane used to trap pigeons on the open lands north of what is now Danforth Avenue. The district was called "The Plains" by Toronto people, and belonged, Mr. Townson thinks, to the Church, and consequently lay vacant and uncultivated for many years. It was covered with a considerable growth of scrub oak which seemed to come in on lands cleared of original pine forests, and the acorns attracted pigeons in the spring.

Diagram of method of netting pigeons as described by Mr. Townson.

Another method is shown by the sketch on page 126, which is reproduced from that contained in Mr. Christopher Stephenson's report.

This shows a ground plan of the arrangements, while the section at the upper right gives a side elevation of the part which lifted the net up and over the birds. Mr. Stephenson says: "There was only one person in the neighbourhood [Halton county, Nelson township] that used the net. I remember going to see the kind of arrangement he had. I was only a young boy then but boy-like wanted to see how it was done."

The nets themselves were evidently much the same as a seine net used for fish. Dr. R. H. Arthur of Sudbury says: "The net was usually made by sewing together two strips of 'seine' 15 or 20 feet long and 10 to 12 feet wide—bound around edges with withes. . . ."

The Royal Ontario Museum of Zoology has a net donated by Mr. Abram H. Culp of Beamsville, Ontario, and used by his grandfather, S. R. Culp of Vineland. This is of the seine type with a mesh of four

inches, and is roughly twenty feet long by ten feet wide, a net which would not make any very great hauls.

A correspondent, Mr. Difenderfer, describes how nets were made: "Pigeon nets were woven by hand, 2 inch mesh, of medium size seine twine. 40 by 60 ft. was regular size, some were longer and some wider. The shuttle was made from hickory; was 12 in. long, $1\frac{3}{4}$ wide, and $\frac{3}{8}$ to $\frac{1}{2}$ in. thick. Cord was wound on shuttle around prong in centre and cup in end. Shuttle would hold about 100 ft. of twine."

Diagram of method of netting pigeons as described by Mr. Stephenson.

Different situations were chosen for bait-beds, some setting their nets in an open field and building hides of corn stalks or branches, while others made use of local shelter as described in a Welland county report: "As the fences were all rail, father would hide on the other side, when the pigeons would alight to feed on peas, buckwheat or wheat, as the feed might be. . . .When the pigeons came along the net he would pull the string; down would go the net. Then he would hold tightly on the string or tie it to the fence, then get busy reaching underneath it and grab all you wanted. Sometimes there would be so many birds under the net it would raise a foot high in the centre." (Garnet G. Laur, Bridgeburg.)

Grain was used as bait and sometimes artificial salt beds were pre-

pared. We have no record of this latter custom in Ontario, but as it may very well have been used here I will quote an account, "How the Marsh Beds were Prepared to Attract the Birds," from French (75): "The ground was spaded and raked over as in the making of a garden, then a quantity of salt was scattered over and whipped into the earth with a brush until it was thoroughly mixed. The pigeons would eat this 'muck' with a relish. This mixture doubtless aided the birds to digest their rich diet, which consisted in the main of beech nuts and black-jack acorns. The salt was applied about every other day in small quantities to freshen the 'muck' bed."

Netting in Ontario

There follows a list of Ontario counties in which netting was done; the numbers indicate the number of times it was reported in answers to our questionnaires from the various counties.

Dufferin, 1; Durham, 1; Elgin, 1; Essex, 1; Grey, 3; Haldimand, 1 (with stool pigeon, 10-40 at one haul); Halton, 1; Hastings, 2 (one reply says "only a few nets"); Kent, 1; Lincoln, 3 (one with stool pigeon); Middlesex, 1 (we know from other sources that netting must have been done commonly in this county); Ontario, 1; Prince Edward, 1; Victoria, 1; Waterloo, 1; Welland, 5 (one with stool pigeon); York, 3 (one similar to Jack Miner's crow net).

These numbers are really not very satisfactory, as it is generally impossible to tell whether the information in a reply refers to the whole county or merely to the locality known to the writer. As I think I have indicated before, personal knowledge of the country fifty years ago was very localized; travel was so arduous, roads so bad, means of transport so slow and uncomfortable, that a man wasted no time in merely "seeing the country", and so knew very little of his distant neighbours' doings. However, the numbers given must be to a certain extent indicative of the prevalence of netting since the highest numbers come from regions where we know pigeons were exported or were very numerous.

Trapping

Besides netting there were many other methods used to capture pigeons. Trapping was done to some extent but few particulars can be given as most correspondents failed to supply any details of the ways in which it was done. Miss Pollard of Tillsonburg says: "Mostly trapped in a big box about the size of a waggon. Grain was put under the box, the box being raised about a foot from the ground, with props to which ropes were attached. The trap was usually set on a high knoll near the edge of the woods and when all ready, the trapper would hide

behind a tree or stump until the birds came for the grain, and when all he wanted were in the trap, he would pull the rope and let the box drop over them. It had a slat top, through which he removed them to kill. Everyone preferred the trapped ones for eating as there was no danger of them biting into shot."

These box traps were sometimes made with netting tops.

Trapping was done in the following counties in Ontario, according to our records:

Essex, one record; Grey, three records; Hastings, one record; North-umberland, one record (kept alive in pens until needed); Oxford, two records; Welland, one record.

As pigeons so often came in the spring about sugar making time sap troughs were sometimes employed as traps, no doubt when the birds were in too great numbers to be resisted, and when no other means of catching them was at hand. "We boys used to trap the wild pigeons by means of a sap-trough set on edge. What a thrill of delight to see this down! The poor captives were drawn forth and their necks wrung without a pang. Thoughtless cruelty of boys. I couldn't do it now. I hate even to *see* anything killed" (128).

Other Methods of Taking Pigeons

As has been described before, pigeons had a habit of sometimes flying very low over hill tops, barn roofs or other eminences, and people often posted themselves at such points of vantage and knocked the birds down with clubs, poles, or branches. This was apparently done quite commonly as eighteen of our questionnaires refer to it, and it is mentioned now and then in the literature. Wm. Pope (147) refers to it as a way of taking tired birds that flew very low after crossing Lake Erie. It seems a slow and wearisome method, but perhaps it was done in those days to save powder and shot which were none too plentiful. Roosting birds were also knocked from the perches by sticks as described by Mr Hebner in the section on marketing; and young birds were taken from the nests either by day or by torch light at night.

Snares were used in Glengarry and Simcoe counties, but no details of the methods are given. Near Stouffville, York county, they were caught "by placing a platform up about 8 feet from the ground and putting sticking wax on, and some wheat for them to eat." (Mr. David Clarke, Stouffville). In fact, every means for destruction that human ingenuity could devise was employed. One or two of the more unusual of these are interesting. A correspondent from Carleton county says that his brother told him "that when he was a boy they would build

houses out of the sheaves of grain and catch them by the legs and pull them in," presumably the boys hiding inside the houses.

Chief Justice Latchford of Toronto says: "One method used in Hull was to lash a long dry pole to a limb used as a roost. From the tip of the pole a line led to a hide. The pole was drawn back and when the limb was sufficiently occupied the line was released and the pole knocked the birds from the limb."

Mr. William Teskey of Orillia writes: "During potato harvest it was sport to get a tough gad, point it, put a potato on it, and hurl the missile at the continuous flocks of pigeons. We lost many potatoes, but secured very few pigeons."

Mr. George A. Reid, the artist, of Toronto, told me that when he was a boy he was sent one day to a neighbour's to borrow the sheep-shears. Coming back along the road pigeons began to fly over his head, so low as to be more than tempting. Almost instinctively he tossed up the shears he was carrying and to his great surprise down came a pigeon.

VARIATION IN NUMBERS

It is now generally recognized that many species of mammals, birds and insects show a more or less regular fluctuation in numbers. Some vary from one month to another, others in a yearly cycle; and others again have a maximum and minimum which may cover several years from peak to peak.

The fact that wild pigeons were so numerous in a certain locality in one year and almost absent in another might lead one to believe that they experienced such fluctuations. Perhaps they may have done so, but from the information at hand it is impossible to be quite positive either one way or the other. However, certain deductions can be made from the available data. "Pigeon years", that is, years when the species was noticeably abundant, occurred, according to some people, every three or four years; others say, every five or six years, and Mr. Townson of Toronto thought they were more numerous every six or eight years. From this it might appear that the numbers of the birds rose and fell in a somewhat irregular cycle, but I do not think this was the case, and for several reasons. Pigeons were, as is being continually reiterated, highly erratic in their movements, largely influenced by food supply, so that it is an obvious conclusion that when they were scarce in one place they were numerous in another. This is clearly shown to have been the case in the table of nesting records, and it has also been pointed out that very large nestings took place simultaneously in several localities. So that scarcity or absence in a given region even over a period of years is not necessarily an indication of reduced numbers.

Another more definite and interesting proof of comparative constancy of numbers was found in the following way. I made a list, from questionnaires, etc., of the years in which pigeons were said to be *unusually* numerous and found that they had been so, in varying localities, every year between 1853 and 1879. Also many of our correspondents say that the number of pigeons in their locality was regular from year to year. There is therefore no clear evidence that the species was characterized by any unusual periodic fluctuation in numbers.

DECREASE AND EXTERMINATION

Theory of Sudden Disappearance a Fallacy

The idea is very prevalent that passenger pigeons vanished from the face of the earth with amazing rapidity—that they were abundant one year and gone the next—and in consequence many and strange tales have been spun to account for their disappearance. They were reported to have been all drowned in the gulf of Mexico, or in the Atlantic, or in Lake Michigan. It was said that they flew to Australia, or South America; that they were all consumed in a great forest fire in Wisconsin; that they flew to the north pole and were frozen; or that they were poisoned wholesale in the southern States. These are some of the stories that have arisen, but they are fantastic and ridiculous. One or two of them no doubt originally contained a grain of truth since many pigeons undoubtedly were drowned in the Great Lakes and elsewhere during foggy or stormy weather, just as are other species of birds. Also forest fire was an element in their destruction, as will be shown presently. But the greatest argument against complete destruction of the species in any such manner lies in the fact that all the passenger pigeons in the country were not contained in one flock but, as has already been proved, great flocks occurred simultaneously in widely separated localities. To drown or burn them all would have necessitated an almost continent-wide flood or conflagration.

With these fallacies disposed of, and the matter carefully considered, it becomes quite clear that the extermination of the species was a prolonged affair, having its beginning in the earliest days of the white man's arrival on the continent and slowly gathering impetus through the years, coming to a grand finale in the last quarter of the nineteenth century.

The first mention of the early settlers' effect upon the pigeons seems to be that of Josselyn (98) about 1660, when he says: "But of late they are much diminished, the English taking them with nets." In the next century Pierre François Xavier de Charlevoix says in a letter dated at Montreal, April 22, 1721, to the Duchess of Lesdiquieres (99): "The

other article I mentioned, is the sort of wood-pigeon which used to come hither in the months of May and June, as was said, in such numbers as to darken the air, but the case is different at present. Nevertheless, a very great number still come to rest themselves upon the trees, even in the neighbourhood of the towns. . . ."

Peter Kalm (81) says that the birds were being driven into the wilderness by man's habitations and by his destruction and through competition for food with the swine so commonly turned into the woods to feed on acorns. In 1765 Samuel Smith (161) mentions this latter fact in his history of New Jersey, as already quoted in another connection.

John Lambert (105), also quoted before, says: ". . . but the immense flocks that formerly passed over the country are now considerably diminished; or, as the land becomes cleared, they retire back." This being between 1806-08.

In 1841 Sir Richard Bonnycastle (26) says: "The sportsman finds few snipe, woodcock, pigeons or plover in comparison with former years."

And so in many places in the early literature and on down into our own times the theme is that flocks and nestings of wild pigeons were never as large as they used to be in the "old days." What "my father" saw in his youth was not to be compared with what "his father" had seen, and although, as I have pointed out, numbers tend to grow in retrospect, I think in this case it was an actual fact. At first in the seventeenth century the decrease must have been almost imperceptible to anyone who could have viewed conditions from the broadest standpoint. As Josselyn said they may have been appreciably scarcer in the settled areas, but this was undoubtedly due much more to change of locality than to actual diminution of numbers. It would quite probably be several generations before the white man's destruction had its marked effect on the species. But once its influence was felt it swept on with the gathering force of an avalanche until the final overwhelming outburst of market hunters and trap-shooters of the late nineteenth century.

Disappearance in Ontario

When the full extent of this destructive movement is realized, as it should be from the discussion which is to follow, it is quite evident that details which we possess of the disappearance of passenger pigeons in Ontario form merely a facet in the whole. In the list of last appearances which follows there are, aside from Fleming's already well known records (68-70), few that have the definite scientific value of being backed by available specimens. However, many are without doubt entirely reliable; and even when dates are only approximate, comparison with last appearances from other regions, such as those recorded by Mershon

(131j), Barrows (15c) and Forbush (71a), shows the Ontario trend to be similar. Last large flights were seen during the '70's. Last groups and individuals were noticed from about 1880 on, with an occasional flock of considerable size still appearing sporadically in the '80's. Records continue with diminishing frequency until 1900, after which the majority are of very doubtful value.

Last reported appearances in Ontario

Information in the following list of last appearances is taken in most instances directly from questionnaire replies. A few items are included which are decidedly vague, but are the only data from the locality to which they refer.

- 1870—Welland county. April. Last large flight in the vicinity of Font-hill. Lasted two days. See Migration Flight Table, and also compare below for the year 1883. Reported in questionnaire by A. W. Reavley, Ridgeway, Ontario.
- 1872 c.—Lambton county. Last large flight. Reported verbally by A. M. Thoman, Arkona, Ontario.
- 1872 c.—Dufferin county. Last large flight. Lasted two and a half days. Reported in questionnaire by Robert Reid, Camilla, Ontario.
- 1874—York county, Toronto island, April 3 or 4. Last large flight over Toronto. Described by John Townson in article read before the Brodie Club, Toronto. See also Appendix.
- 1876 or '77—Middlesex county. There went “. . . great flocks to the east or northeast and never returned.” Reported in questionnaire by Peter Anderson, Strathroy, Ontario.
- 1878 c.—Frontenac county. Last *large* flight. Reported in questionnaire by Professor W. T. MacClement, Queen's University, Kingston, Ontario.
- 1878—Welland county. Small flocks were “to be seen as late as the year 1878.” Reported in letter by Geo. A. Phillips, Welland, Ontario.
- 1879 c.—Hastings county. Last large flocks flew to the east in the spring. Reported in questionnaire by A. O. Garrison, Plainfield, Ontario.
- 1880 c.—Grey county. “In about the year 1880 there came quite late in the evening, a very large flock and roosted in a bush near our house, in number we thought about 100,000—they left again early in the morning.” Reported in questionnaire by John D. McArthur, Meaford, Ontario.
- 1880—Grey county. “The last pigeons near the village of Leith [near Owen Sound] were killed by John Thomson, father of Tom Thomson the artist, in the year 1880. He killed two. For three years

- previous to 1880 not one pigeon had been seen." Reported in questionnaire by James P. Telford, Owen Sound, Ontario.
- 1880 c.—Manitoulin Island. "Seen about 1880." Reported in questionnaire by Dr. R. Moore, Fort Frances, Ontario.
- 1881—Durham county, near Bowmanville. A stray pigeon or two about in September. Letter dated September 12, from "Au Sable" (John W. Dutton (58b)).
- 1881 c.—Peterborough county, one mile east of Lakefield. August. Fourteen shot. The last the writer saw in that locality. Reported in questionnaire by Dr. Alex. Bell, Toronto.
- 1881—Wellington county, Guelph. "The last wild pigeon that I saw—a lone hen—was in July, 1881. It sat on a dead branch on top of a tree near the river opposite where the Ontario Reformatory now stands." Howitt (93).
- 1882—Essex county, Point Pelee. "In 1882 my stay there extended through the last days of August, and a week or so in September, and during that time we often saw small flocks . . . running up to perhaps fifteen or twenty. They would rush up the Point or down . . . at a speed which was all their own . . . I have one specimen from that trip, although we shot several. It is a male, labelled August, 1882." W. E. Saunders. Quoted in Taverner and Swales (170). See also list of Specimens in Ontario Collections.
- 1882 c.—Hastings county. "Last one seen or heard of was shot by me in the fall, in October, about 1882, at Coe Hill." Reported in questionnaire by W. H. Wilcox, Toronto.
- 1882-1884—Northumberland county. Still scattered flocks during these years. Reported by Mr. John Townson in Brodie Club article and also verbally to the author. See Appendix.
- 1883—Haldimand county. Last record April 9, 1883. McCallum (117).
- 1883—Thunder Bay District. Long Lake region. "Very scarce." Borron (27a).
- 1883—Welland county. "Wild pigeons are reported to have made their appearance in very large quantities in the cedar swamps, about twenty miles from Niagara Falls, Canada." Letter from "C. E. L." dated at Suspension Bridge, N.Y., March 20, 1883. "Forest and Stream", 1883 (103).
- 1883—York county. "In September, 1883, I was shooting woodcock in the vicinity of the Rouge river I saw a pigeon flying overhead through the tree-tops, which I brought down and discovered that it was a female passenger pigeon in splendid condition. This specimen, the last I shot, was given to the late David Herring, but have no idea

- what ultimately became of it." John Townson, article read before the Brodie Club. See Appendix.
- 1884—Carleton county, Ottawa. June 6. A male shot in Cummings Woods, Ottawa. Eifrig (62).
- 1884 c.—Dufferin county. Very large nesting occurred. See Table of Nesting Colonies.
- 1884—Lennox and Addington county. "In 1884 killed my last two. But a year or so later noticed a wounded one around part of the summer. Quite tame." Reported in questionnaire by Nelson Instant, Stella, Amherst Island, Ontario.
- 1884—Hastings county. Two shot, in early fall, by E. Brooke-Daykin then living in Madoc.
- 1884—Wellington county. "The last passenger pigeon that I saw was in the spring of 1884." Reported in questionnaire by Robert Pasmore, Rockwood, Ontario.
- 1884—York county, Toronto. "The passenger pigeon still occasionally visits the region where once dense clouds of these birds used to cover the fences and trees." Mulvany (136).
- 1885—Bruce county. "Scarce as hens' teeth." "Tamarack" (169).
- 1885—Carleton county, Ottawa. June 28. Female and one young shot near McKay's lake, Ottawa.
May 10 and August 25. A male seen in Col. W. White's garden, Ottawa. Lloyd (113).
- 1885—Middlesex county, London. "The latest record of birds that probably bred in the London district is that of 3 or 4 birds, a male, female and young, which were seen and the female and one young shot, about 15 miles east of London, on September 24th, 1885." Saunders (22c).
- 1885—Ontario county, Washburns island in Lake Scugog. October. One seen. Reported in questionnaire by Mr. John Townson, Toronto.
- 1885—Perth county, Listowel. June 10. Eleven seen and "odd ones seen since." Kells (100).
- 1885—Simcoe county. September. "I was out hunting ruffed grouse with an uncle. I saw a pair of pigeons alight on a hemlock tree about 60 yards distant. He took my gun and aimed between them and both fell. These were the last shot in our section—September, 1885." Reported in questionnaire by Mark Robinson, Algonquin Park.
- 1886—Carleton county, Ottawa. April 15. Twelve seen at McKay's lake, Ottawa.
May 24. One seen at McKay's lake, Ottawa. Eifrig (62).

- 1886—Halton county, near Campbellville. A few pairs breeding. Brooks (33).
- 1886—Middlesex county, Strathroy. Practically gone from this region. Barrows (14).
- 1886—Ontario county, Myrtle. “. . . July 4th, 1886, when I saw the last male wild pigeon alive near Myrtle Station on the C.P.R. north of Whitby. When the train stopped to take water a male pigeon came to quench his thirst and, after doing so, flew up to the fence and started to preen his feathers. Then the engine started, and I had my last look at a live wild pigeon.” John Townson. Article read before Brodie Club, Toronto. See Appendix.
- 1886—Wentworth county, Beverley swamp. One shot, April 26. Shot and recorded by Dr. K. C. McIlwraith, of Toronto.
- 1887—Algoma district. “The last pigeons in my experience were in Algoma in 1887. I killed not a few in the region of Echo Bay, and up the Echo river and at Findley Bridge where I was camping for a week.” Reported in letter by Mr. N. Pearson, Aurora, Ontario.
- 1887—Carleton county, Ottawa. August 23. One seen in Col. W. White’s garden, Ottawa.
September 3. One seen at Kettle island, Ottawa. Eifrig (62).
- 1887—Simcoe county, Wasaga Beach. “In 1887 I was picking blue berries near Wasaga Beach. My father and mother and I saw seven Pigeons, the last we saw of these birds.” Reported in questionnaire by Mark Robinson, Algonquin Park, Ontario.
- 1887—Victoria county. “Last fall while shooting in the northern part of Victoria county my companion had the luck to kill one of these beautiful birds, it being the first one taken in that district for several years, although they may be seen occasionally.” W. C. L. (104).
- 1888—Cochrane district, Moose Factory. A set of eggs taken. Macoun (118).
- 1888—Dufferin county. “They were killed September, 1888.” Reported in questionnaire by D. Nelson Phillips, Laurel, Ontario.
- 1888—Middlesex county, Wyton. March 29. Diary says: “. . . Also saw a wild pigeon.” This is last record. Reported in questionnaire by Frank L. Farley, Camrose, Alta.
- 1888—Muskoka District. Shot in fall of 1888, one male. Reported in questionnaire and verbally to the author by Alfred Kay, Port Sydney, Muskoka.
- 1888—Renfrew county, Renfrew. “I shot a bird of this species about three miles west of Renfrew, Ontario, in September, 1888. (Rev. C. J. Bethune).” J. & J. M. Macoun (121).

- 1888—York county, Locust Hill. About May 24th. One shot by Daniel Cox. (Reported verbally to Prof. J. R. Dymond, Royal Ontario Museum of Zoology).
- [1889—Michigan, Mackinac Island. "A large flock was seen feeding in beech woods, August 30, 1889, after which they were frequently seen. About a hundred were observed September 10, and on September 12 the main body departed. But a few individuals were present when I left [September 24]. None were observed in 1890 or 1891." Stewart Edward White (190).]
- 1890—Wentworth county, Aldershot. One female collected by H. B. Dickson. A mounted specimen now in the Royal Ontario Museum of Zoology, donated by Mr. Paul Hahn.
- 1890—York county, Toronto. May 12. Humber island. One male seen by Wm. Cross (52).
September 20 and October 11. An immature female taken on each of these dates. That taken on October 11 being now in the collection of Mr. J. H. Fleming (70). The September 20 specimen is also recorded by Edmonds (60).
- 1891—Algoma district, two miles northeast of Dean Lake Station. One pair seen about the end of May, or first week in June, near the Mississagi river. Reported in questionnaire by Dr. R. H. Arthur, Sudbury, Ontario.
- 1891—Carleton county, Ottawa. Rare, breeds. Lees, Kingston & J. Macoun (110).
- 1891—Hastings county, Belleville. June. One male shot. Reported verbally by Allan Twining, to J. L. Baillie, Jr., of Royal Ontario Museum of Zoology.
- 1891—York county, Toronto. "April 13, saw a male specimen in University Park Ravine, which I pursued for half an hour but failed to collect." Atkinson (7).
- 1892—Sudbury district, Lake Kenogamissi. One seen late July. S. R. Clarke (45).
- 1893—Grey county, St. Vincent township. "In 1893 at north end of St. Vincent. There were three that summer that visited Deer Lake spring on high clay banks on east side. Were seen often at spring and grain fields, but they failed to come again." Reported in questionnaire by Wm. Metcalf, Ravenna, Ontario.
- 1893—Lambton county. August 15. Some seen. "Blue Beech" (25).
- 1895—Grey county, Collingwood township. "The last wild pigeon seen by me was on the back end of my father's farm about the middle of August, 1895. I saw one pair that year." Reported in questionnaire by Alex. Dey, Brownsburg, P.Q.

- 1896—York county, Toronto. April 15. A flock of thirteen, all females or young, seen in High Park. Reported verbally by Geo. Pearce to J. L. Baillie, Royal Ontario Museum of Zoology.
October 22. Eleven seen on Wells Hill by J. Hughes Samuel. Fleming (68).
- 1898—Frontenac county, near Kingston. A small breeding colony, perhaps 20 birds. See Nesting Table. Reported in "Rockwood Review," Nov. 1898 (22c). Also by Professor MacClement of Queen's University, and probably by Dr. C. K. Clarke to Nash (137).
- 1898—Middlesex county, Glencoe. ". . . Mr. D. C. Black, Appin, Ontario, writes recently [1898]: 'I saw nine in a wheat field near the village of Glencoe, and they are the first I have seen in twenty-five years'." Ward (183).
- 1899—Dufferin county, Orangeville. "A flock of ten seen on Easter, 1899." Calvert (35).
- 1900—York county, Etobicoke creek. May 16. Flock of ten seen by O. Spanner. Fleming (68).
Centre Island, Toronto. July 6. Five seen by J. Hughes Samuel. Fleming (68).
- 1902—Simcoe county, Penetanguishene. May 16. One seen. May 18. One pair seen. All three seen by A. L. Young. Fleming (68).

It would seem superfluous to comment in any great detail on this list. The matter of last appearances has been gone into very thoroughly in other publications, and nothing here either adds very materially to, or contradicts, conclusions already arrived at. Even the large nesting of about 1884 is not startling news, for French (75a) reports a great nesting in Pennsylvania in 1886; Barrows (15c) tells of some twelve hundred birds nesting near Lake City, Michigan, in this year, and of thousands appearing at Cadillac in the spring of 1888; while in 1889 even as far east as Maine flocks of pigeons were still to be seen (32).

As to the nesting of 1898 near Kingston, it is recorded on very good authority, and as there were obviously pigeons still existing in 1900 I see no reason for their not attempting to nest somewhere, however unsuccessfully, during these last few years.

CAUSES LEADING TO EXTERMINATION

Probable Immediate Cause

Perhaps the disappearance of the passenger pigeon will always have a slight element of mystery about it. It is difficult for the human mind to grasp the fact that a creature, once so numerous, could vanish utterly and completely from the earth. It is, however, becoming increasingly

clear that no one agency was entirely responsible for the disappearance, but that it was brought about by a combination of circumstances.

The most immediate of these concerned the optimum of the species. For each species of animal there appears to be an optimum number, *i.e.*, a density of population at which it thrives best—as well as a maximum and, in some cases, a minimum. It is easy to understand that there should be a maximum, as it is obvious that only a certain number of individuals can exist in a given locality under given circumstances. But that a minimum should be reached below which a species cannot survive is much more difficult to explain.

Elton (63b), in discussing this phenomenon, cites as an example of its operation the fact that in the Lake Victoria region of Africa, tsetse flies occur on all the islands of the lake except on small ones below a certain size. On the small islands there are no flies, although conditions are apparently just as favourable, showing that the insects cannot exist in numbers below a certain level and so do not occur at all in a space too small to support this number.

It is therefore suggested that the disappearance of the passenger pigeon was due to the reduction of their numbers below the minimum at which the species could exist. No one has yet given a satisfactory explanation of why such a result should follow serious numerical reduction, except that a psychological effect appears to be involved in it. With the passenger pigeon it seems to be a case of a creature used to living in the "grand manner" whose way of life was so upset and reduced that it could not carry on in straitened circumstances. Such a result, of course, does not always follow. Some species are more adaptable than others and are able to persist in greatly reduced numbers, or if conditions become more favourable, to become numerous again. That the passenger pigeon lacked this necessary adaptability is indicated by the observations of Whitman (39f). He found it much duller than other species of pigeons which he kept in captivity. It seemed to be a slave of instinctive habit, for he says: "The passenger pigeon's instinct is wound up to a high point of uniformity and promptness, and her conduct is almost too bluntly regular to be credited even with that stupidity which implies a grain of intelligence."

This theory is also most satisfactory in accounting for the suddenness with which the species finally disappeared, that is, during the twenty years between 1880 and 1900. Elton (63a) says: ". . . great abundance is no criterion that a species is in no danger of extinction. Just as an animal can increase very quickly in a few years under good conditions, so on the other hand it may be entirely wiped out in a few years, even though it is enormously abundant. The argument that a species is in

no danger because it is very common is a complete fallacy." And this applies perfectly to the wild pigeons whose sudden end has heretofore been made believable only by rather unsatisfactory theories, or by the invention of wild tales.

Indeed, there is no doubt in the author's mind that this upsetting of the balance of *Ectopistes migratorius*' equilibrium of life was the final factor contributing to its extinction and I think it may be made clearer by the following discussion of the lesser factors. It will also be shown that the upsetting was done directly by man and not by indirect effects of civilization.

Clearing the Land

Clearing of the land was the first act of the settler and the business of the lumber-jack, and had a decided local effect upon the nesting and roosting of wild pigeons. As Lambert (105) said: "As the land is cleared they retire back." This fact has been brought forward and emphasized by many writers as a primary cause of disappearance, and so it was, but not of *destruction*. It undoubtedly drove the flocks to new nesting sites, further from the settlements, causing *local* "disappearance". And being forced to leave certain regions probably had a subtle adverse effect upon the species. Although pigeons were wanderers it seems apparent that once their course was set it was held rather tenaciously, and perhaps arriving at a favourite nesting site and finding it burned or cleared would upset considerably their physiological arrangements for the season. Whitman says that they were easily disconcerted in this way. One adverse experience was sufficient to break up roosting habits and incubation activities. "Pigeons are very constant to their chosen roosting places, but when once molested in these they do not forget it the next night" (39e).

In Ontario clearing of the land had its inception at the beginning of the nineteenth century. At first the Crown took the best timber, chiefly pine, and then granted the partially cleared areas to the settler. The practice went on for many years, most of southern Ontario being cleared by this method; and it was really not until about 1860 that commercial lumbering was well established. Until 1870 logging activities centred chiefly in the Ottawa valley, then moved westward toward Georgian Bay and thence northward. It was a slow process and it was almost 1900 before there was any great development of the industry in the north.

Forest fire seems to have been a far more destructive element in Ontario. Since the history of the province began almost fifty per cent. has been burned at one time or another, and in some sections, such as

the Rainy River district and the Kenora region, the damage has been excessive, eighty-one per cent. of the former section having been burned over in the past sixty years, or since about 1870. Here and in the United States this fire devastation must have had some effect on the species, both in actually destroying nestings and in changing habitat. And yet it is felt that in spite of this, in spite of the alarming proportions of fire statistics and of changes attendant on settlement and lumbering, there was still, at the end of the nineteenth century, ample shelter and food left in Canada and the United States for great numbers of pigeons. Not perhaps sufficient for the support of the prodigious flocks of the early days, but at least enough for the maintainance of a considerable remnant.

A few more statistics may serve to support this theory. In Ontario, even to-day, thirty-three per cent. of the province is mature forest, uncut and unburned for probably seventy-five years or more (157). Forty or fifty years ago this percentage must have been considerably higher.

From an edition of Rand, McNally & Company's "Indexed Atlas of the World" (151), published in 1883, the following figures are taken showing the amount of wooded country in various states. They are of course very generalized, they give no indication of the type of wood, how, or where it was growing, and much of it was no doubt unfit for pigeon population, but they give at least the idea that there were still, at that date, great expanses of forest in the northern States where pigeons bred.

Maine was estimated to have 10,000,000 acres of pine forests; Vermont, 1,386,934 acres of woodland; Massachusetts, 930,402 acres of woodland; New York "was formerly covered with forests and these are still extensive although the State is one of the most densely populated and best cultivated in the Union"; Pennsylvania, 5,740,854 acres of woodland; Ohio, 5,101,441 acres of woodland; Indiana, about one third forest land; Michigan, still apparently well wooded, although being rapidly deforested.

From all this argument it would seem then that it was not the actual removal of forests that affected the species; but the indirect effect of forced change from a customary habitat may have been disturbing and detrimental and probably contributed just so much more to the wrong side of the balance.

Barrows (15d) thinks that the cutting of pine, beech and oak woods was disastrous in that it deprived the birds of their most important source of food, but it could hardly have been so since clearing produced other food conditions that were highly favourable to them. As land was cleared grain fields increased, and waste clearings usually produce abundant crops of berry bushes—raspberries, gooseberries, huckleberries, etc., which seem to have been relished by pigeons almost as much as their

acorn-beechnut diet. In Ontario at least, the commercial cutting of maple, beech and birch was very localized, due to difficulties in transportation. So that one most important item of pigeons' diet, the beech, would be slow to go, and as has been pointed out before, it still exists in considerable quantities in certain parts of Ontario.

Another theory advanced by Barrows (15d) as a sequel to the changes wrought by clearing the land, is that in consequence wild pigeons were forced to nest farther and farther north. He suggests that here their early nesting habits would frequently encounter spring snow storms, and these, coupled with short summers, would make nesting less and less successful the farther north the birds were driven. The data that we have for northern Ontario are brief and few, but they give no indication of pigeons nesting more commonly in later years. Indeed from the general trend one would be inclined to judge that they were here, as elsewhere, more common in the early days. It was 1772 when they "abounded" at Moose Factory (74) and about 1883 Borron (27b) found no signs of nesting in the Moose river basin.

Disease

Disease has been suggested as an important element in destruction. "Hog cholera" and a form of "diphtheria" have been described as carrying off wild pigeons in enormous numbers in various localities. A great deal of evidence for the diphtheria argument has been gathered by Thompson (174), which seems to indicate that as the species was weakening it became susceptible to disease, and in this connection it is pertinent to note that Thomson (175) states that the English wood pigeon frequently suffers epidemics of a form of diphtheria, the "symptoms" of which are similar to those described in the pamphlet just mentioned.

It is of course also possible that some poultry or domestic pigeon disease may have been transmitted to *Ectopistes*. Frequent mention is made, by our correspondents and in the literature, of wild pigeons coming to feed in barn yards and around farms where grain or chicken feed was in tempting quantities. In this way parasites or bacteria could be easily spread among them and would probably have disastrous effects as is so often the case with an introduced disease. That such transmission is possible is evidenced by the studies of Gross (82). Indeed he believes that the introduction of blackhead by pheasants among the heath hens was to a great extent responsible for the latter's extermination.

It is unfortunate that no scientific investigation of reported disease among passenger pigeons was ever made. In a normal state they were certainly subject to sufficient checks in other ways. They were not prolific, even if they raised two or three broods in a season. Their nests

were frail and poorly built, causing high mortality amongst the young. Squabs when newly out of the nest were unusually fat and clumsy, being fair game for their natural enemies. Early migration led to heavy casualties from late snow storms. All these should have been quite enough to keep numbers within bounds and make epidemics unnecessary.

Man's Destruction of the Species

When the white man came to America with its teeming wild life, from the very outset he shot, trapped and killed every wild thing he encountered, from the squirrel to the buffalo. At first hunting was for food, to supply the often dire need of the struggling colonist, but as time went on and life became somewhat more secure, hunting became more organized as a sport and thus far more destructive to wild life. In various places we read of what were called "squirrel hunts," when the men of a neighbourhood would go off for perhaps a week's shooting, during which time anything was considered game. Here are the figures for one day's "squirrel hunt" bag as related by Weld (184): "1 wild cat, 7 red foxes, 29 raccoons, 76 woodchucks, 101 rabbits, 21 owls, 42 hawks, 103 partridges, 14 quails, 39 crows, 4,497 gray, red, black and striped squirrels, 25 wild ducks, besides unnumbered pigeons, jays, woodpeckers, etc."

As has been shown throughout this treatise, wild pigeons came in for more than their share of destruction and their extermination supplies probably the best example known of the relentless power of man's stupidity. To the first arrivals in America it was quite inconceivable that the numbers of passenger pigeons could ever be lessened and even to us now it seems surprising for men to have brought about the disappearance of all the pigeons seen by Audubon and Wilson in their day, even in the seventy-five years left between Audubon's observations and the days of "last appearances." But the secret of the puzzle lies very largely in the fact that men had access to the nesting colonies. If pigeons, like many of our ducks, had nested only in the most northerly parts of their range, they would have survived for many more years, particularly if spring shooting had been abolished.

Spring shooting of any species is obviously disastrous. It cuts off the capital and of necessity reduces the income, or rather the out-put, and not only were passenger pigeons subjected to this on the widest and most devastating scale, but they were never free from persecution at any time of the year. The fat squabs were always considered a delicacy, young birds in the summer were much sought after, and adults were taken everywhere at any time.

Market Hunters

Although the battle was continuous since the earliest days of the English and French settlements, it reached its culmination with the advent of the market hunter, who put in his appearance about 1840 and spread over the country with the development of the railways. For the next forty years these men carried on their business, increasing in number each year, and were assisted in their work by all the improvements of the age—better roads, telegraphic systems, refrigeration, and so on.

The best idea of the scope of the trade can be obtained from Mershon's collection of letters and articles on the subject (131), and even a most superficial reading gives the vivid impression that no species of living creature could have survived such persecution. Not only does it seem more than sufficient to have disastrously upset the balance of the wild pigeons' optimum, as suggested, but it becomes a surprising fact that even a limited number were left surviving until the end of the century.

Mershon's figures are only of the official slaughter, and while it was going on private individuals were still decimating their local flocks and visiting their nearby nesting colonies, killing for sport and food, supplying their friends and salting down the surplus for the winter. Mershon's pages are full of very damning evidence, both circumstantial and direct, and one of the most interesting sets of figures is in the reprint of an article by Martin (124). This was written as refutation of the results of an investigation carried on by Professor H. B. Roney at the great Petoskey nesting of 1878. Mr. Roney apparently estimated that one million five hundred thousand dead and eighty thousand live birds had been shipped by rail from this nesting quite exclusive of those sent by boat, and other means, or taken by Indians, and Mr. Martin hastens to correct such shocking exaggeration. He says: "I have official figures before me, and they show that the shipments from Petoskey and Boyne Falls were:

Petoskey, dead, by express.....	490,000
Petoskey, alive, by express.....	86,400
Boyne Falls, dead.....	47,100
Boyne Falls, alive.....	42,696
Petoskey, dead, by boat, estimated.....	110,000
Petoskey, alive, by boat, estimated.....	33,640
Cheboygan, dead, by boat, estimated.....	108,300
Cheboygan, alive, by boat, estimated.....	89,730
Other points, dead and alive, estimated.....	100,000
	<hr/>
	1,107,866

"This may be set down as accurate or nearly so, and 1,500,000 will cover the total destruction of birds by net, gun and Indians." A mere bagatelle as compared to Mr. Roney's over-estimation!

Another quotation will serve to stress how widespread and persistent this business was. Osborn (131e) writes: "In 1861 a large body of birds were in Ohio roosting in the Hocking Hills, my first year out [as a market hunter] we were at Circleville, and my company shipped over 225 barrels, mostly to New York and Boston. The birds fed on the corn fields. In 1862 the birds nested at Monroe, Wisconsin. We commenced in May and remained until the last of August. The several companies put up some ten thousand dozen for stall feeding after the freight shipment. Express charges on each barrel were \$7 to \$9. In the fall of 1862 we had fine sport shooting birds in the roost at Johnstown, Ohio (now Ada), some four weeks. Then the birds moved to Logan county. After two weeks the birds skipped south, it being December and snow on the ground.

"In 1863 the birds nested in Pennsylvania. We had some fine sport at Smith Port and Sheffield. . . . In 1864, at St. Charles, Minn., we had some fine sport, but our freights were high to New York, so we came to Leon, Wisconsin. A heavy body was nesting in the Kickapoo woods, and several companies of hunters located here. In 1865 a heavy nesting was in Canada. . . . We next went to Wisconsin, where a heavy snow-storm broke up the roosts. We were at Afton, Brandon and Appleton. We then went to Rochester, Minn., the end of the railroad. . . . We then went to Marquette in the Upper Peninsula and camped on Dead river. A heavy body had got through nesting, but worlds of birds were feeding on blueberries.

"In 1866 the birds nested in a heavy body near Martinsville, Indiana. We caught some birds at Cartersburg. After we closed up in Indiana we went to Pennsylvania. There was a heavy nesting near Wilcox, at Highlands. In gathering squabs five of us got a barrel a piece, which netted us \$75 to \$100 per barrel in New York. They struck a bare market." And this tale continues year by year until 1878, and when one considers that it is only one pigeonier's story and that there were estimated to be about five thousand operating throughout the United States and to some extent in Canada, it does not seem so strange, mysterious and unexplainable that passenger pigeons vanished from the earth.

Contemporary Opinions on Extermination

It is of interest to see the various theories and opinions that were brought forward while this organized and wholesale destruction was going on. There were a few thinking people who were also observers,

and two realized in what direction affairs were tending, but the majority seem to have obstinately held the opinion that pigeons, and indeed most of the wild life of the country, were inexhaustible. Benedict Révoil, the French huntsman, was among the thoughtful, and in writing of his adventures in America, which evidently took place between 1840 and 1850, he says (55):

"As the reader will infer from the foregoing remarks, this variety of game [passenger pigeons] is, in America, threatened with destruction. In proportion as civilization extends into the vast wilderness of the West, men increase in number, and the human race, which everywhere reigns despotically, and permits no restraint upon its tyranny, gradually destroys the communities of animals. Already the deer, the goats, and the great horned cattle which peopled the ancient colonies of England, have almost disappeared in the principal states of the Union. The herds of bison which a hundred years ago pastured peacefully on the savannahs beyond the Mississippi see their ranks thinning daily; while the skeletons of their fellows, slain by trappers and emigrants and Indians, whiten on the ground, and mark the gradual advance of man. Everything leads to the belief that the pigeons which cannot endure isolation, forced to fly or to change their habits as the territory of North America shall become peopled with the overplus of Europe, will eventually disappear from this continent; and if the world endure a century longer, I will wager that the amateur of ornithology will find no pigeons except in select museums of Natural History."

About the same time (1850) Strickland (166) says: "I have been informed that this breeding place [in Fenelon township, Ontario] has been deserted for several years, owing to the settlements having approached too near to please the winged possessors.

"This satisfactorily accounts for the decrease I have noticed amongst these feathered denizens of the forest, during the last seven or eight years. In consequence of their having been disturbed, they have sought a more remote breeding-place. I am not at all certain whether this decrease is general through the province; but I feel quite convinced that, as civilization increases, all kinds of birds and wild animals will become less numerous, with the exception of crows and mice, which are greatly on the increase."

On the other side there is the report of a select committee of the Senate of Ohio in 1857, on a bill proposed to protect the passenger pigeon (143):

"The passenger pigeon needs no protection, wonderfully prolific, having the vast forests of the north as its breeding grounds, travelling hundreds of miles in search of food, it is here to-day and elsewhere to-

morrow, and no ordinary destruction can lessen them, or be missed from the myriads that are yearly produced."

And the following reasoning is even more strange (12):

"They disappeared quite suddenly from some cause which is yet undiscovered. It is customary, even among ornithologists, to claim that they were exterminated by man, as the bison were, but all the evidence is against this. At the State Sportsmen's convention held in Utica in 1873 wild pigeons were used as targets. From my scrapbook I find that the number of birds shot at during the two days of this convention was 2,860, in the regular matches. There were probably sweep-stakes and outside matches requiring many more. So cheap were they that my recollection is that the price for sweep-stakes was only 25 cents per bird shot at. Up to that time, therefore, and probably for a year or two after they were common enough to be used by thousands for targets at State Association meetings. [As has been shown already, they were "common enough" up to 1880, and afterwards, for this purpose] Ten thousand were purchased each year, I am informed, . . .

". . . The records of others, marketmen, dealers and observers, show that these birds nested in millions, perhaps billions, in the States about the Great Lakes, yearly, up to 1878. During this year they were killed, trapped and shipped alive and dead in as great numbers as ever (a million and a quarter birds from one district). It seemed impossible that these immense numbers could be much reduced except by years of persecution. [Perhaps the author thought the million and a quarter birds would be resurrected to produce a supply for 1879]. But the next year, 1879, the birds did not return to their usual nesting places. It was supposed that they had gone further west or further north and the scouts of the hunters and the trappers would soon discover the nesting place again. But though searched for thoroughly by those who, being financially interested, spent time and money liberally, they were never found and the few birds which occurred throughout the country, though no longer disturbed continued to diminish in numbers till they have entirely disappeared. . . ."

It is obvious of course that Mr. Bagg's last argument is based on misinformation—pigeons nested in Michigan and other States and in Canada for many years after 1878, and they certainly must have been "disturbed" as birds continued to appear in markets until the early '90's. The destruction at Petoskey in 1878 did seem to give the final push to the slowly descending balance, but Bendire (21a) sums up the situation which prevailed during the last twenty years of the century when he says:

"In fact, the extermination of the Passenger Pigeon has progressed so rapidly during the past twenty years that it looks now as if their total

extermination might be accomplished within the present century. The only thing which retards their complete extinction is that it no longer pays to net these birds, they being too scarce for this now, at least in the more settled portions of the country, and also, perhaps, that from constant and unremitting persecution on their breeding grounds they have changed their habits somewhat, the majority no longer breeding in colonies, but scattering over the country and breeding in isolated pairs."

LEGISLATION

We are so accustomed now to employing legislation for the protection of wild life and for the saving of species whose numbers are reduced that it is natural to wonder what part the law played in the history of the passenger pigeon.

The first law which affected pigeons favourably was one passed in Vermont in 1851 which protected all non-game birds all the year round and imposed a fine of one dollar for each offense in the destroying of nests or eggs.

Other laws dealing directly with wild pigeons prohibited shooting and netting within varying distances of nesting colonies, breaking up of nests, etc., in various States; but it is quite apparent that they were usually ignored and seldom if ever enforced. And there was an early law in Massachusetts (1848) that protected netters from disturbance, imposing a fine of ten dollars and damages on anyone frightening pigeons away from nets. The Ohio opinion that pigeons needed no protection seems to have been the prevalent one. It was not until 1897, which as we know now was much too late, that Michigan declared a closed season of ten years on the species, and in 1905 it was put in the non-game bird class and so obtained year-round protection (142a).

Apparently it was not protected in Ontario until too late. The Small Bird Act of 1887 contains the following: "No Birds, except game birds, eagles, falcons, hawks, owls, wild pigeons, black birds, crows, English sparrows and ravens to be at any time killed or molested . . ." and from then until 1897 it is included in all such lists of exceptions. At this date the birds protected in the province were "wild native birds (other than game birds, English sparrow, hawks, crow and blackbirds)" and as pigeons do not seem to have been put on the list of game birds they no doubt received protection at this time.

In Quebec they were not protected in 1899 and might still be trapped or netted there at that date (142c); and they were unprotected in Manitoba by the revised statutes of the province for 1891 (142b).

Thus there seems to have been little effort by legislation to save the

species from extinction, due perhaps to several reasons. In the early days of game laws, pigeons were apparently too numerous to conceivably need protection. Then the species became so commercially important that it was in the interest of market hunters and trap-shooters to keep it unprotected; and finally it was considered by many people in the same class as sparrows or blackbirds, either too common to notice or too destructive to warrant protection.

LIFE HISTORY

Ectopistes migratorius was a gregarious species, migrating and nesting in enormous numbers, but nesting also, as do many gregarious birds, in small colonies and even in scattered pairs. It was wide ranging, occurring from the Atlantic seaboard to the Rocky Mountains and from the Mackenzie district to the gulf of Mexico.

It was seemingly erratic in its appearances, being governed by food supply—abundance of mast or other food usually assuring its occurrence in a given locality.

Arrival and departure were variable in date, being again controlled largely by food supply. In spring the species would appear in the breeding areas any time between March 1st and June 1st. After nesting the immediate vicinity of the nesting site might be deserted at once, or the site might be used as a roost throughout the summer. Flocks of various sizes wandered after nesting and these sometimes gathered in large numbers in some central locality from which there would be a general exodus in the fall.

The autumn migration was more desultory than the spring and probably covered a period from the end of September until well on into November. Under favourable conditions birds were known to stay during the winter in the more northern parts of their range.

Nesting took place normally in large colonies, often many square miles in extent, which comprised practically any species of tree that would hold the nests. These were frail affairs placed commonly near the trunk of the tree and at varying heights although more usually in the lower branches.

The eggs were pure white, one or two in number. Male and female shared in brooding and feeding the young, and alternated in these duties with great regularity, the cocks being on the nest between 10 a.m. and 4 p.m. approximately. The incubation period seems to have varied, perhaps due to weather and food supply, and apparently ranged from twelve and a half days (as with Whitman's captive birds) to about three weeks. The young were quite helpless on hatching, and for a

period were fed a secretion from the parents' crop known as pigeon's milk and later with regurgitated food. The squabs remained in the nest for about two weeks, and were very fat and clumsy on first leaving it.

The number of broods seems to have been variable, but at least two were usual; and it is highly probable that a new nest was built for the second brood. Nesting took place throughout several months, although the period in any one locality might be quite short. Colonies could be found any time between early March and late July according to the region.

Large roosts were frequently formed to which the birds repaired at night; in fact, it is probable that if sufficient evidence could be obtained it would be found that each nesting colony had an adjacent roost. Centralized roosting also occurred after nesting was over, either in the roosts already formed or in new locations.

The passenger pigeon fed largely on vegetable material, eating mast, berries of many kinds, grain, and roots, and it also ate, on occasion, worms, grubs and caterpillars. In ground feeding the species exhibited the rotary habit common to some terrestrial feeders, that is, they moved over the surface with a broad front, the birds in the rear continually rising and flying forward to settle in advance of the front ranks. They drank, as do all pigeons, without lifting the head.

Although seemingly erratic in their yearly appearances and non-appearances, in their daily life they had many firmly fixed habits. They were very faithful to their roosting, feeding and drinking places, and would follow the same route with great regularity, each day, to and from these various localities. And in their migration flights, the route, once taken, would be held for several days by the successive flocks.

SPECIMENS IN ONTARIO COLLECTIONS

Specimens in Royal Ontario Museum

Definite locality unknown

91-11-1-912, ♂, 1889, Ontario. Purchased.

04-11-1-146, ♂, Ontario. Donor Lady Gzowski.

Dufferin county

35-4-26-2, about 1865, near Orangeville. Donor Paul Hahn.

Elgin county

33-11-22-1, 1857, Paynes. Donor Paul Hahn.

Frontenac county

30-6-17-2, ♀, Kingston. Donor E. Beupre.

30-6-17-3, ♂, Kingston. Donor E. Beupre.

Hastings county

26-11-1-1, June 12, 1890, Coe Hill. Purchased.

Huron county

31-10-31-1, ♂, about 1860, Goderich township. Donor Paul Hahn.

Kent county?

28-3-21-1, ♂, St. Clair Flats. Donor Paul Hahn.

Manitoulin Island

33-12-12-1, early 1890's. Donor Paul Hahn.

Middlesex county

32-4-19-30, ♂, 1873, Strathburn. Donor Paul Hahn.

32-4-19-31, ♂, 1873, Strathburn. Donor Paul Hahn.

34-4-13-3, about 1880, Hyde Park. Donor Paul Hahn.

Northumberland county

33-8-31-24, ♂, about 1863, Grafton. Donor Paul Hahn.

33-8-31-25, about 1863, Grafton. Donor Paul Hahn.

33-8-31-26, ♀, about 1863, Grafton. Donor Paul Hahn.

33-8-31-27, ♂, about 1863, Grafton. Donor Paul Hahn.

Ontario county

31-1-28-1, ♂, Pickering. Donor Paul Hahn.

31-1-28-2, ♀, Pickering. Donor Paul Hahn.

34-7-22-1, ♂, Pickering. Donors Geo. J. and Chas. Fothergill.

34-7-22-2, ♂, about 1870, Port Perry. Donor Port Perry Library Board.

34-7-22-3, ♂, about 1870, Port Perry. Donor Port Perry Library Board.

Oxford county

34-5-17-1, ♀, about 1863, Embro. Donor Paul Hahn.

Perth county

30-10-17-1, ♀, 1869, Lot 31, Con. 8, Elma township. Donor Paul Hahn.

Peterborough county

30-6-20-3, April, 1891, Peterborough. From Ontario Provincial Museum.

30-11-23-1, ♂, about 1876, Lakefield. Donor Paul Hahn.

Prince Edward county

32-8-29-1, ♂, early '70's, Huycks Point, Hillier township. Purchased.

Simcoe county

34-8-8-1, about 1870. Donor Paul Hahn.

35-4-2-2, Imm. Barrie. Donor H. Percy Bingham.

35-4-2-3, Imm. Barrie. Donor H. Percy Bingham.

Wentworth county

30-3-14-1, ♀, 1890, Aldershot. Donor Paul Hahn.

York county

18-12-10-25, ♂, Toronto Island. Donor W. H. Merritt.

19-2-7-1, ♂, Yonge and Carlton Streets, Toronto. Donor Paul Hahn.

27-10-1-1, ♂, 1865, Yonge and Carlton Streets, Toronto. Donor Paul Hahn.

30-1-16-1, 1871, Mimico. Donor Paul Hahn.

30-10-2-1, ♂, mid-September, 1879, northeast Toronto. Donor Paul Hahn.

31-12-30-1, ♂, West Toronto. Donor Mrs. H. A. W. MacKid.

33-12-29-1, about 1876, Jameson Avenue, Toronto. Donor Mrs. F. H. Gooch.

34-3-23-1, ♂, 1871, Tannery Hollow, Toronto. Donor Paul Hahn.

34-3-23-2, ♀, 1871, Tannery Hollow, Toronto. Donor Paul Hahn.

34-4-19-1, autumn about 1874, Don Valley, Toronto. Donor Paul Hahn.

34-6-7-1, ♂, April about 1880, Bathurst and Ulster Streets, Toronto. Donor Paul Hahn.

Specimens with no data

70-1-1-84, ♀. Old Collection.

11-4-3-63, ♂. Donor Rev. John Doel.

14-6-12-3, ♂. Donated by Knox College.

18-8-12-1, ♀. Donor Paul Hahn.

20-11-16-1, ♂. Purchased.

20-11-16-2, ♀. Purchased.

21-2-15-1, ♂. Donor Paul Hahn.

21-12-6-1, ♂. Donor Dr. C. T. Currelly.

- 21-12-12-1, ♂. Purchased.
- 24-11-4-2. Donor Paul Hahn.
- 26-11-1-2, ♂. Purchased.
- 26-11-2-1, ♂. Donor Paul Hahn.
- 27-10-21-1, ♂. Donor Paul Hahn.
- 29-4-19-3, ♂. By exchange.
- 30-10-25-1, ♂. Donor Paul Hahn.
- 31-4-22-15, ♂. Donor Mrs. J. F. W. Ross.
- 31-4-22-16, Yg. Donor Mrs. J. F. W. Ross.
- 32-6-1-1, ♂. Donor Cecil R. Allison.
- 33-6-20-2, ♂. From Ontario Provincial Museum.
- 33-6-20-42, ♂. From Ontario Provincial Museum.
- 33-6-20-44, ♂. From Ontario Provincial Museum.
- 33-9-1-230, ♂. Purchased.
- 34-4-28-1. Donor Paul Hahn.
- 35-2-5-1, ♂. Donor Miss Wheatley, Yorkshire, England.
- 35-5-30-2. Donor C. G. Brennand.
- 35-4-26-1. Donor Wm. Petrie.
- 35-4-16-1. Donor Paul Hahn.

United States

- 34-1-5-1, ♂, about 1878, Flint, Michigan. Donor Paul Hahn.
- 34-1-5-2, ♀, about 1878, Flint, Michigan. Donor Paul Hahn.
- 34-5-8-21, ♂, May 13, 1888, Oak Forest, Indiana. Donor W. A. Brodie.
- 34-5-8-22, ♀, May 13, 1888, Oak Forest, Indiana. Donor W. A. Brodie.

Specimens in the McIlwraith Collection, Hamilton, Ontario

- ♂ and ♀ shot about the year 1863 at Hamilton by T. McIlwraith.

Specimens in Collection of W. E. Saunders, London, Ontario

- 110, ♂, August, 1882, Point Pelee, Ontario.
- 449-24-9-85, juvenile male and
- 450-24-9-85, ♀, both shot September 24, 1885, four miles east of Dorchester (14 miles east of London). Recorded Ottawa Naturalist, May, 1902, p. 43 (22c).
- 4447 (♂?), about 1860, by Mr. Haskett, probably on what is now the Fair grounds in the city of London.

Mounted Specimens in National Museum, Ottawa

- 4403, ♂, near Toronto.
- 286, ♂, probably Toronto or London. Holman Collection.
- 6461, no data.

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APPENDIX

*Extract from the diary (written between 1816 and 1841, but unpublished) of
Charles Fothergill, M.P. first post-master of Port Hope, Ontario*

"The migrations of pigeons into Canada from the south are eccentric, and uncertain as to numbers and seasons though no year is without its myriads. It is, however, seldom seen in the depths of Winter, though such instances have occurred, and they have been known to fly, as it is called, that is to move from one distant place to another every month in the year, as was the case during the Winter of 1826-27, as well as in the Spring and Fall. Their numbers are generally so great as to exceed all that could be conceived by Europeans.

"It is believed, and upon good grounds, that the bird breeds every month in the year save one—that in which it travels. In Canada they usually breed by single pairs scattered up and down in the forests, after the manner of the ring-dove in England; and I was often at a loss to account for the singularity, that in the western parts of the United States particularly, they breed together in immense associations, covering at times more than ten miles square, every tree in that space being covered with nests; whilst in Canada such coteries are so rare, that until the Summer of 1827, or rather the Spring of that year, for they were mostly gone or removed by the first of June, I never knew of such an assemblage. However, in 1827, on the shores of Lake Ontario about ten miles west of Port Hope, there was such an assemblage of nests as covered a space of more than five miles square, and the multitudes that were killed filled many wagons. I have not heard by enquiry amongst the oldest inhabitants of more than two or three instances of a similar kind in any part of Upper Canada, although millions are annually produced in their usual detached manner, by single couples nidificating alone in solitary places. This peculiarity, as well as the flying in Winter, I have little doubt has been occasioned by the abundance of beech-nuts which has been extraordinary this year (1827)—as these nuts constitute their favorite food and this fruit wholly fails to the southward. The flight of this species is greatly regulated by the quantity or scarcity of this kind of food.

"The flavor of the flesh of the wild birds, and especially of the young ones, greatly exceeds that of the tame pigeon, and their numbers proved a valuable acquisition to the first settlers as an article of food. Such numbers were formerly brought to the market of Quebec by the country people, that it was found necessary to make a police law preventing the vendors from leaving those they could not dispose of to rot and putrify—and the price is frequently not more than three pence a dozen. They are commonly taken in nets, which is the easiest and least expensive mode, though vast numbers are shot. If on the alert during the morning and evening flights, any ordinary sportsman may load himself in a very short time, less than an hour, without moving from the same spot.

"It is observable that the various flocks on the wing uniformly pursue the same general course, or fly to the same point of the compass. As to computing the numbers that migrate into Canada from the United States in the course of twenty-four hours, some conception may be formed from the single fact that I have known 1,500,000 to pass over one small field in a single day. When it is considered that similar streams of birds are pouring in from the south every hundred yards or less, along a frontier of nearly eighteen hundred miles in extent, every Spring, and still greater numbers returning in the Fall, there is nothing in nature to compare with these prolific myriads, except it be the ocean of herrings which annually move from the great depths around the Northern pole to the Southward.

"The female pigeon of the wild variety differs from the male in being a trifle less, generally half an inch, shorter—and is more plainly attired having none of the fine rufous, or ferrugineous on the breast. The chin and throat of the female is of a dirty white; the forepart of the neck and breast a dark drab color. A little burnishing of green and gold distinguish the sides of the neck, but by no means in so brilliant a manner as in the male. The sides in both male and female are bright dove color, and the under tail coverts white."

Extracts from Diary of William Pope (149)

William Pope was born in Maidstone, Kent, England, in 1811, and sailed for America in March of 1834. He lived in various parts of western Ontario, finally settling at Port Ryerse, where he lived for the last forty years of his life. He was an artist of some ability and during these years in Ontario painted many birds. The frontispiece of this book is a good example of his work.

The following extracts are taken from a typewritten copy of his diary, this copy being in the Toronto Reference Library:

1835 September 11. Near St. Thomas. "The pigeons are very scarce here this Season.—I have not seen more than a dozen small Flocks since the Spring when they even were totally plentiful [sic]. The great failure of Food in the Forests this year, particularly Beech-nuts and Acorns, has caused the Pigeons to forsake this part of the Country for some more favoured spot where the late Spring Frosts, here so severe, did very little or no damage. Most probably these Birds have all migrated to the South.

"In June and July I found these birds dispersed about in twos and threes, sometimes singly and in small parties of five or six together,—I commonly met with them at this time along the banks of the small 'Creeks' in the woods, especially during the midday's heat, and about the small swamps and the low flat lands where the Hickory, Basswood and Black Ash are the principal Trees. They were generally on the ground seeking a particular kind of plant that chiefly flourishes in these parts of the Forest and the white crisp roots of which afford them a great part of their substance at this time of the year. On approaching nigh to the Pigeons they merrily flew to some of the nearest branches,—the shooter having nothing to do but to walk up within shooting distance and take them off their perch as easily as he pleases, the pigeons having but little fear of the Shooter or his weapon—Poor Sport this for an Englishman, though these birds must be shot at sitting when in the Woods, as from the inconceivable rapidity with which they wing their flight in passing through the Forest like a sudden gleam of Sunshine, there is but little chance of killing them when in the act of flying. At this time of the year and throughout the Fall while they stay in the country they frequent the wheat Stubbles and fields of Buckwheat of which they are particularly fond. —They now congregate into immense flocks and I am told that it is no uncommon thing to kill thirty or forty birds at a single discharge from an ordinary fowling piece. —Most of the inhabitants that have guns in his possession now, as well as at other periods when the pigeons make their appearance, turn out and slaughter vast numbers. —Pigeons being now the order of the Day from one end of the country to the other,—almost every Family treating themselves with a mess of them. It is astonishing what prodigious quantities are killed and yet to all appearances their numbers are not lessened even in the slightest degree. I am told by credible persons that they do not observe any decrease in the vast flocks of these birds but that they appear still as large and as numerous as they did 20 or 30 years back. —They are extremely uncertain in making their periodical visits, depending altogether upon the abundance or scarcity of Food in the Woods. —If it happens to be a plentiful year plenty of

Acorns and Beech-nuts, it is next to certain that Pigeons will appear in great plenty likewise,—but on the contrary—should it unfortunately prove an unfruitful season that year, you may reckon upon having no Pigeons or at best very few as it turned out this year,—the Pigeons regulating their movements altogether upon the article of Food. —It necessarily follows that from the habit these birds have of assembling together in immense flocks requiring a great supply of food and a large extent of feeding ground they cannot remain in any tract of country when that necessary article is not in abundance. —This may be the case for two or three years,—no Nuts or Mast,—no Pigeons—then again come a fruitful Season and once more come the Pigeons. —Consequently one year there may be a great plenty of them and for one, two or more years there will be very few or none at all being altogether dependent upon the times and Seasons. —In some parts of Canada and the States as well the people make use of Clap Nets in capturing these birds. —The Nets are 50 or 60 yards in length being made to fall by the fowler pulling a string. Some live birds or dead skins stuffed and set up so to appear alive and put under the nets together with some Corn, wheat or grain of some sort, for the purpose of decoying the wild Birds down, then flying over, spy out the decoy birds, take a flight or two round and settle down crowding together under the net and now the fowler pulling the fatal string encloses the poor birds in great numbers. —The feathers of the breast are very good for stuffing Beds and the breasts after being cut out are sometimes salted down for future provision. —The people living on the Lake Shores are sometimes able to take these birds by merely standing on the steep banks and knocking them down as they pass by. —The birds being much exhausted by their long flight over the Lakes, especially in the Spring one half of the flocks at that season consisting of the newly raised young which are not then capable of sustaining such great exertion without suffering much distress and fatigue. —They, therefore, fly very low at first gaining land sufficiently so as to be within reach of a moderate pole, —and are even sometimes so utterly worn out on their arrival as to suffer themselves to be knocked off the tree upon which they have settled to rest themselves. —They are middling good eating when young, but when old are hard and dry and the worst bird in that respect that I have met in Canada. —They are almost one half the size of the English Wood Pigeon and differ considerably in plumages. —Almost incredible stories are related about these birds in regard to their extraordinary numbers. The great size of their breeding and roosting places about which such wonders are related by “Travellers and Naturalists” as almost to exceed belief,—for the Natural History of this remarkable Bird I shall refer to that distinguished student of Nature, the indefatigable Wilson,” [Quotes Wilson at length].

The next extract is from the second part of the Diary, written probably in 1835 or 1836.

October 2. “This day I shot 7 Pigeons; there were 8 of them in the flock; they were feeding on a piece of young wheat and they were the last I saw this season. [These remarks are evidently an elaboration of a brief note occurring some pages previously.] —On inquiring of one old settler in this part of the country and a man of credit of what extent the largest flock of these birds he had ever seen consisted, he told me that once he observed them passing over in close array as far as the view extended on either side and the time they continued flying was about half an hour. —I also heard another person relate that he had seen a flock of Pigeons about a mile in width continue flying for 3 hours. —These must have been ‘considerable flocks,’ but are nothing compared to some tales related of the prodigious multitudes of these birds. —There must be amazing numbers of these birds as sometimes for the space of a week or fortnight flocks

of pigeons from twenty to one or two hundred in a flock will keep passing over a certain district all in the same direction, and one flock appearing as soon as the previous one is lost sight of following each other in quick succession. —At such times a shooter has nothing to do but to place himself in a favourable situation and he may continue firing at each succeeding flock all the livelong day till at last he grows weary with the work of destruction."

April 15. "... Last evening I killed a wild pigeon—being my first this season—they are very scarce yet. I have only seen two small flocks."

May 15. "... Saw several flocks of Pigeons passing towards the East—none of them came near me."

May 23. "—have seen several flocks of Pigeons during the last 3 or 4 days."

May 25. "... killed 10 couple of Pigeons being the most I have yet bagged in one day—three times I killed 2 at one shot—and all sitting except 1, this flock was in the vicinity of a newly sown piece of pease. There were 200 more or less in it, but they were very shy—especially in the afternoon 2 of those I killed were young birds. —Saw several small flocks pass over during the course of the day. Had some dinner at a log-house belonging to the farm on which I was shooting. It was most confoundedly hot about 10 o'clock. I nearly fainted once—there was no water nigh and the weight of a dozen pigeons in my game bag made my skin 'pretty considerably' moist. I 'calculated' tough work fagging under a burning sun with the glass up to 100 and the cursed mosquitoes buzzing in the neighbourhood of your ears."

June 1. "Bagged 12 couple of pigeons and 1½ brace of partridge—had some capital sport on this day—the best time for shooting Pigeons is very early in the morning and between the hours of 3 and 5 in the afternoon when they come to the Pea Fields, etc., for food—soon after 5 they go away to roost. In the heat of the day they keep pretty much in the 'Bush' sitting about on the trees and frequenting the creeks and swales for water. In low swampy places they find a kind of root which serves them for food—it is of a whitish colour and is hot and has much the same flavour as horse radish.

June 2. "Shot 8½ of pigeons and an old she raccoon. I lost 3 or 4 birds that I wounded owing to the left hand barrel of my gun getting around at the muzzle which when the gun is cleaned turns the charge. The first pigeon I killed on this day lodged in a beech tree. I climbed up about 30 feet and got within 6 feet of it and there I stuck. I clung for about half a minute like a wounded squirrel, but finding I could not manage the rest of the distance, I slid down again—I then fired at the bird again and knocked it out. . . ."

Sketches of Upper Canada. W. B. Wells. 1837 (186)

"A stranger will be astonished to witness the clouds of wild pigeons which wave through the whole province at different seasons of the year. The account given by Mr. Cooper in the 'Pioneers' of their being slaughtered with a culverin is no fiction. Myriads are brought down with every kind of missile, from the single bullet to the brick-bat. They journey to the north in summer where they have 'rookeries' (?) miles in extent. The clangour there heard equals the din of the loudest tempest, or the sweeping wings of Milton's infernal troop of demons. In fact, if put on short allowance, an army might here take up its summer quarters, and live on pigeon pies very cheaply—a hint, deserving the notice of Mr. Spring Rice, when planning a reduction in the army estimates. On returning in autumn they visit your wheat and pea fields, and coo and strut about your premises quite at home."

*Reminiscences of a Canadian Pioneer for the last Fifty Years.**Samuel Thompson, 1884 (173)*

"A few miles distant was a pigeon roost. In spring, the birds would come flying round the east shore of Lake Huron, skirting the Georgian bay, in such vast clouds as to darken the sun; and so swiftly that swan-shot failed to bring them down unless striking them in the rear; and, even then, we rarely got them, as the velocity of their flight impelled them far into the thicket before falling. These beautiful creatures attacked our crops with serious results, and devoured all our young peas. I have known twenty-five pigeons killed at a single shot; and have myself got a dozen by firing at random into a maple tree on which they had alighted, but where not one had been visible.

"The pigeon roost itself was a marvel. Men, women and children went by the hundred, some with guns, but the majority with baskets, to pick up the countless birds that had been disabled by the fall of great branches of trees broken off by the weight of their roosting comrades overhead. The women skinned the birds, cut off their plump breasts, throwing the remainder away, and packed them in barrels with salt, for keeping." [This occurred in the township of Sunnidale, Simcoe county.]

A Reminiscence of the Last Great Flight of the Passenger Pigeon (Ectopistes migratorius) in Canada. By Percy R. Lowe, from information derived from Dr. A. B. Welford of Woodstock, Ontario, Canada. (115)

"On one of the hot days of last July there walked into the Bird-room of the British Museum a gentleman from Woodstock, Ontario, in Canada. This was Doctor A. B. Welford, who had not been to England for forty years, and in his hand he bore a fine skin of a Passenger Pigeon which he wished to present to the Museum. Almost at the last moment of leaving his home for England, he had packed it in one of his trunks—a happy thought—for although it had been well preserved in his house as a precious relic of one of the most remarkable phenomena in the history of birds and was in fact in a very excellent state of preservation, such relics are perhaps safer in an institution like the British Museum. Gratefully as we accepted Dr. Welford's gift, we were still more grateful for the very interesting account which the donor gave us of his own personal experience of the last great flight of the Passenger Pigeon. It must be getting a rare event, nowadays, to listen to the story of a man who had actually witnessed one of the last devastating flights of this remarkable bird, and as we listened, wholly absorbed, I came to the conclusion that such a story was too good to be lost in the hazy limbo of mere hearsay recollection. I therefore asked Dr. Welford if he would kindly jot down for publication a few notes as to the main facts and incidents of his experience, and here they are, woven into what I think is a story which may well interest the readers of 'The Ibis'."

"The Passenger Pigeon which I have presented to the British Museum of Natural History was shot by me in the spring flight (April) of 1870 (about), near Woodstock, in Ontario. I am not absolutely clear as to the year or month, but I feel fairly sure it was April. I remember too, that it was a Monday, for there had been a large flight on the preceding day, and I can well recollect regretting that it was a Sunday, as we had up till then never seen such an unusual flight; although, as it turned out, this was only the advance guard.

"For many years previously there had of course taken place the usual spring flights from the south, but no one in those days remembered ever having seen anything com-

parable to the prodigious flight which occurred in the spring of 1869 or 1870. In previous years, if we had a bag of eight or ten a day it was considered good shooting, unless indeed one had had the fortune to be quietly lying in wait in the wood when a large flock alighted in one's immediate neighbourhood. On such a lucky occasion the flock would always first alight in the trees, and the birds would commence their sweet plaintive calls, which were very similar to those of the domestic pigeon, but with a very much prettier trill and accentuation, and a curious ventriloquial effect. After calling in this way for some time, a few birds, emboldened by the apparent peace and safety, would fly down to the ground, quickly followed by more and more, until hundreds of the entire flock would soon be searching for the beech-nuts on or under the fallen leaves. It was, as I have said, on these fortunate occasions that one might get fifteen to twenty-five birds with a double shot just as they rose *en masse* from the ground, but as a rule I was quite content with ten birds in a day's shooting and sometimes got none. Moreover, in the years previous to the big flight, the pigeons used to be very shy and difficult to approach, for usually the trees and undergrowth had not begun to put forth their leaves, and the birds, like wild geese, seemed to have a habit of putting out sentinels, so that when these flew away the entire flock would be off.

"On the particular Monday of which I write the birds came over in incredible numbers, some idea of which may be gained by what happened to me personally.

"I was up that morning very early, and so were the birds. I had taken up a position on the top of some rising ground, behind a rail or small fence which ran along the edge of a wood in which were growing some beech trees which supplied the favourite food of the pigeons. The beech-nuts had been lying covered with snow all through the winter, but were now exposed. Between the spot where I stood and another large wood was a small open clearing or meadow. By this time the air was black with flock upon flock of pigeons all going eastward. Some were flying high, but others just cleared the wood in front of me, and then swooping down to the meadow, flew very close to the ground, so close indeed that it was necessary for them to rise before clearing the low fence in front of me. This was my opportunity; and as they cleared the fence, so I fired into wave upon wave.

"They came on in such numbers that thousands would pass between the discharge of my double-barrelled gun and its reloading—a longer process then, in the days of muzzle-loaders, than now. At about 10 a.m., not being in the least prepared for such phenomenal slaughter, I ran out of powder and shot, having then 400 birds to my credit, during the shooting of which it was not unusual to get from fifteen to twenty-five with a 'right and left'. Being now unable to do any more shooting until I had secured more ammunition I hurried home, a distance of one and a half miles, got a horse and light waggon, returned to the scene of my battue with some grain-bags holding one and a half bushels of ordinary grain, filled them with the pigeons and made tracks for my home again. All the time I was filling the sacks the birds were still streaming low over the fence, so that before leaving I hid myself behind it, and taking a long slender cedar rail, knocked down many more as they came over.

"This, however, to my then youthful notions, did not appeal so much as shooting, so that, after dropping my birds at home, I drove into town (Woodstock, Ontario) for more powder and shot and caps, a distance of three and a half miles. During the entire drive there and back, flocks of millions of pigeons were filling the air and shadowing the sun like clouds. The roar of their wings resembled low rumbling thunder, and the shooting from scores of guns could be heard for miles, resounding from wood to wood like a small mimic battle.

"This great flight continued from before daylight to dusk and lasted for some days, gradually lessening until the flight was over.

"Each succeeding year for several years ordinary flights continued, but in greatly reduced numbers, until they ceased altogether."

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"Such in substance and fact is Dr. Welford's written statement, and his account of this wonderful flight corresponds in every essential particular with the story which he told on the spur of the moment to Mr. Kinnear and myself. What, we may well ask, is the explanation of this swift and tumultuous passing of the Passenger Pigeon, of this final orgy or riot of reproductive energy?

"We may think of something akin to an abnormal stimulation or feverish exhaustion of the germ plasm, but how that over-stimulation arose, if it ever existed, it would be difficult to say. There seems, for instance, no evidence to suggest that it was due to an abnormal supply of food and if it had been it would have affected other species of the family. We may fancifully compare it to the last flaring up of the dying spark of life in a race which was already doomed and approaching its end, or to a final and resplendent *finale* to an original creative impulse with which the species was launched from the 'family tree' to run its inevitable course upon the face of the earth. We may think of it as a race whose germ-potency had, so to speak, 'outrun the constable', like so many other races we have knowledge of in past geological ages; but instead of running to fantastic sizes, as in the case of so many of the reptiles whose doom was sealed, it rioted in a spendthrift revelry of numbers, which led to exhaustion and extinction. We may, if it so pleases us, surmise that its vital mechanism had, for some cause or other simply burnt itself out, or that there was some sudden alteration in the sex-ratio; but whatever we choose to think, there are I believe two causes at least for which there would appear to be a very justifiable doubt as to their being the actual determining factors leading to the total and final disappearance of the Passenger Pigeon from this planet. One of them is a microbic infection, the other the machinations of man, wholesale as the latter were. If it had been the first, there would have been abundant and patent evidence available, and as to the second, the probabilities seem all against such an idea; for if the Passenger Pigeon had not, for some reason which we cannot yet fathom, been doomed to disappear utterly and finally, we should surely have witnessed small scattered populations still holding out in such places where chance and protection afforded them the opportunity.

"Doubtless there will be not a few who will dissent. It will be pointed out that the Passenger Pigeon was a food-migrant, that did not continue in one place, thereby militating against its preservation in specially protected areas. But its migrations were the result of its immense hordes and consequent scarcity of food in any one locality, and we can scarcely believe that a small colony amply provided with a sufficiency of beech-nuts, acorns and other provender would have left their breeding grounds for the mere lust of wandering. Other objections, too, may be advanced, such as the facilities, especially in former times in the States, for indiscriminate shooting, just when the fate of the species was apparently trembling in the balance. Yet in spite of all such objections, in spite of the untold slaughter of thousands upon thousands by every means, legal and illegal, I still imagine we have not yet fathomed the secret of this pigeon's complete extermination."

The Passenger Pigeon. C. A. Fleming (66)

"Let us go back into the Sixties to a farm in the Township of Derby, Grey County, and allow the mind to go back over some of the incidents of boyhood days. It is early spring, the middle of April or later, when the passenger pigeon or wild pigeon as they

were more commonly called, would begin to come in flocks. It is evening, getting on to about an hour or so before sunset, and the great flocks of blue-gray birds would appear. Perhaps you had been ploughing and they would make a circle or two and light on the freshly ploughed field and look for food. Other flocks would fly overhead or off to one side going right on north. Others would light on the zig-zag rail fences. Sometimes great flocks would come and if they passed west of you they would hide the sun from view for a minute or more. The flocks often flew quite low so that we boys would strike them with sticks and bring home a few. A year or so older and we knew how to sharpen our knives and use them. We would select some nice straight cedar split into pieces about an inch square and say eighteen inches long. A nail would be driven into one end, of each piece, all the heads ground off and brought to a sharp point on the grindstone. Then arrows would be shaped out of these pieces of cedar, perhaps twenty-five or thirty to be ready for business when the pigeons came. A piece of straight-grained rock elm would be found about four feet long and split and shaped up to make the splendid bows with which to shoot our arrows.

"Selecting a suitable spot where the flocks often passed we would shoot the arrows into the flocks. If the sharp pointed arrow hit a bird, it was 'our meat'. The arrow would stick and bring it down—that is when we managed to make a strike—of course there were so many air holes through the flocks, that if one out of a dozen arrows brought a bird it was considered extra good luck.

"Though they were called wild pigeons, they were not difficult to approach. When flying in flocks of hundreds or thousands you would think sometimes they were coming straight at you, when all at once when within thirty or forty feet distant, they would make a quick turn to the right or left or upward, a swift and most graceful turn, and away in another direction. It would almost seem sometimes as if they just tried to see how near they could come and get away successfully. The flocks often seemed to fly hither and thither over the forests for the very joy of flight. When they flew to the east of you in the evening, so that the sun shone on them, there was a perfect riot of color as they passed. The male birds being much finer looking and more showy than the female, the sheen of their plumage in the evening sun was such that no words could be found to describe nor a painter to paint it. The flash of brilliant color and the wonderful whirr of their wings in flight as they passed within a few yards can never be forgotten.

"I see another side of the picture. The farmer had started in the morning to sow a ten acre field of wheat by hand broadcast. The teams were finishing ploughing on the other side of the field and were only hitched to the harrows about three o'clock in the afternoon, consequently the seed on only about six acres was covered. The evening flight of the birds was on strong and so numerous were the flocks that not a grain of seed on the four acres was left. It had to be sowed over again the next day. The only compensation was a fine pigeon pie the next day for dinner—the result of a few charges of number four shot from the old muzzle loading gun, but that did not save the seed wheat.

"Arriving at the age of ten years the old single barrel shot gun was available after careful instruction as to how to load it, fire it and care for it and a few lessons as to how, where and when to shoot. It was no use to fire at a flock when coming towards you. The shot would glance off those thickly feathered, highly polished breasts, and you would scarcely ever see one fall—but just turn around and get them when they were going away from you and you would get your birds from one to half a dozen at a shot.

"Another way was to get them after they lit on the top rail of a zig-zag fence. A neighbour bought a new gun. A very nice patent breech gun with a highly polished walnut stock, the finest in the settlement. He would be out early in the morning to

get a shot at the pigeons that would light on the rail fences, but he never could get more than one bird at a shot. Before this he would often be given three or four by some of us boys when we had taken from six to a dozen at a shot from the top of the fence before he got his new shooting iron.

"One fine morning he seemed anxious to trade his new one for my old weather-worn plug breech gun that cost \$3.50 when new. I knew my father would not allow any trade of that kind, so I picked up his gun, loaded it from his powder and shot flasks and waited my chance. Presently a flock lit on the fence within easy range. I moved away a little to get my position, and fired and handed him his gun and eleven birds. He had been getting in a line with the rail on which they perched and of course only got the end bird, but taking them on the angle it was easy enough to strip off the whole line. It was not difficult to get all the birds needed for household use during the spring months before they started nesting and raising their young. No person needed to be without fowl when they wished them. There was a parody on an old hymn that was often repeated as the opening of the pigeon season began:

When I can sight my shotgun clear,
To pigeons in the sky,
I'll bid farewell to salted pork,
And feed on pigeon pie.

"At this time there was very little clearing done north of the gravel road that runs east and west between Owen Sound and Southampton. It was almost solid bush from this road to Tobermory, the north point of the Bruce peninsula. There were of course small clearings here and there. This almost unbroken forest furnished excellent nesting facilities for millions upon millions of passenger pigeons that no man could number. Soon after their arrival in the spring they made preparation for housekeeping in this forest every spring. They built their nests in the tree tops. It was not unusual to see as many as a dozen nests in a single tree, and there never seemed to be any family quarrels among them. In the evening they gathered in quite large flocks and flew long distances away from the rookery in search of food. There were also early morning flights to the settled country to the south. Of course, half of them had to stay home to carry on the hatching of the young and caring for them. It is supposed that those that went on the evening trip would remain home and attend to the household duties while their mates were on the morning flight in search of food. In the rookery there was no fuss or flying away when a bunch of hunters would invade their territory; they seemed to feel safe and secure from harm in their seclusion.

"There was no such thing as shooting into flocks and bringing down quite a number of birds at a time. It was just one bird at a time, all single shots, but you could shoot them just as rapidly as you could load your gun. Men would come from town with grain sacks and fill them, one bird at a time, until the supply of ammunition ran out. These sacks could be taken home and distribution made to neighbours, and I have heard it frequently stated that any surplus over was fed to pigs. I do not know of them being sold or marketed.

"Such wanton slaughter, especially during nesting season, was a disgrace, but there were so many of them that no one seemed to take a thought for the young families being left without parental care.

"While the great bulk of the pigeons nested in the recognized rookery, quite a few nested in the woods belonging to the farmer settlers all over the country, so that anyone could go out with his gun and bring in a few in an hour or two.

"As clearing, timbering and lumbering made inroads on the forest the rookery was pushed farther north each year. Soon after confederation year, 1867, there began to be fewer flocks and fewer birds in the flocks. As time went on the numbers grew less each succeeding year. The woods no longer resounded with the well-known cry as in former years. By the year 1875 there were only a few. The last one I ever saw, I shot in a large beech tree in the township of Sullivan near Dornoch about the beginning of September, 1878.

"When the wheat was ripe in early August and cut and stooked, it was quite interesting to see a flock of a few thousand pigeons circle around over the field and alight on the stooks of wheat. They would entirely cover the grain heads where they were exposed. The farmer was usually alive to the trouble and frequently his gun took a toll of the invaders. The grain at that time was put together twelve sheaves to a stook. Ten were set up on their butt ends in the stubble in a double row, and two were spread over them, but towards the middle for a double purpose (1) to shed the rain if wet weather came and (2) to cover the heads of ten sheaves and only leave two exposed to the pigeons when they came.

"If a person who has seen the great flocks of passenger pigeons were to give the actual facts of what they have seen, the average person of the twentieth century would be likely to suggest that Annanias of New Testament time had come to life again. At the risk of being called by this unpopular Bible name, I will relate the following:

"About the middle of a fine field of about twenty acres of the best wheat land on the old homestead, there stood a clump of young trees standing uninjured during the clearing operations. There were five white ash trees that were short, thick and stout from twenty to twenty-five feet high, and one tall slender rock elm tree, six to seven inches in diameter and between forty to fifty feet tall. This little grove of trees was a very inviting place for the pigeons to alight and make observations as to the prospect of some good meals in preparation for the flight in the fall. The stout ash trees stood the strain of the extra weight quite well. Not so with the elm. The extra weight of a thousand pigeons or more bent it over towards the east. The prevailing winds in this section of the country being from the west, there were more and larger branches on the east side. The pigeons continued year after year to alight on the rock elm in great numbers, and by the year 1865 it was in the form of a half circle, the top resting on the ground a little over twenty feet away from the root. It remained permanently in this position until it was cut down by the writer in 1878."

*An Account of Passenger Pigeons—By John Townson.
Read before the Brodie Club of Toronto*

"My first close-up view of the wild pigeon occurred in 1864, when I was eight years of age. At that time we lived on Winchester Street, near the Necropolis, and my father, who was an amateur taxidermist and interested in all forms of bird life, made frequent trips up the Don valley. On Sunday morning, early in April, in the year above mentioned, I accompanied him in his usual stroll up the river. When we had proceeded a short distance north of the Winchester St. bridge, a flock of wild pigeons (probably two hundred or more) were seen flying up the valley. Opposite Castle Frank at the spot where the west end of the Bloor St. viaduct now is, the flock turned to the left and settled down among the trees. We climbed up the hillside, which was much more densely wooded then than it is at the present time, and as we neared the crest of the hill we could hear the noise of the birds fluttering about and calling, which, as I recollect it, was louder and more shrill than the notes of the mourning dove; anyway they were making considerable noise.

"To use a phrase which I have often heard quoted since, 'the woods were full of 'em.' We watched the birds for several minutes and it was an unforgettable sight; then a shot was fired across the ravine near the head of Parliament Street and the alarmed birds took flight with a deafening roar and resumed their journey northward.

"It might be explained here that shooting on Sunday in those days was not uncommon, especially when the pigeons were flying. Also at that time there was a large tract of open ground extending from St. James Cemetery over to the end of Bloor St. where the old blockhouse stood on the crest of the ravine where the Sherbourne St. bridge is now located. This open stretch of ground was a favourite place for the local gunners to wait for the pigeons as they lowered down after passing over the city and for many years was known as 'Pigeon Green'.

"In the following year, 1865, my father received a letter from a friend of his, who was one of the early settlers in the district between Barrie and Orillia, that a roost of wild pigeons existed nine miles northeast of Barrie. Accordingly father and Dr. Riddell paid a visit to the locality where the pigeons were nesting. The breeding ground chosen by the pigeons was a ridge covered with hardwood, mostly beech, with some maple, oak and birch. He stated that the birds were there literally in thousands, and he was inclined to be cautious when speaking about numbers. He never used the word million, because he contended that very few people had any conception of what the word million meant, consequently it can be taken as a fact that there were great numbers of birds there. He also said there were from four or five up to seventeen nests—the highest number he counted—on some of the trees. The nests were constructed on the nearly horizontal limbs, loosely-built affairs of broken twigs, generally containing two eggs, but in some cases only one. The nests were usually built about fifteen feet from the ground upward.

"During April, 1866, my father visited a rookery in Huron County, near the headwaters of the Maitland River, which was of larger extent than the previously mentioned one in the vicinity of Barrie; otherwise the conditions were similar. This completes my personal knowledge of 'roosts' or 'nestings' in Ontario, although there may have been others that I did not hear of.

"Migratory the wild pigeons undoubtedly were, but they did not follow the regular air lines which other migrants as a rule do, but seemed to roam about the country in an erratic manner, probably seeking out favourable feeding grounds. The numbers of the birds that visited the vicinity of Toronto in the spring varied greatly, but in 1876 I saw a greater number of wild pigeons in one vast flock than I ever expected to see. One morning about the middle of April in that particular year (1876) I happened to be on Toronto Island near the Eastern Channel, when I noticed what I supposed to be an immense black cloud over the lake to the southeast moving towards Scarboro Heights, but as there was a moderate north wind blowing I could not figure out how the cloud was moving against the wind. However, I did not have long to wait, as the moving mass changed its course and swung to the westward, and in a few minutes the northern edge of the flock was directly overhead and I found myself gazing at an innumerable flock of wild pigeons. The birds were flying at a height, as near as I could judge, of probably 500 feet, but as the visibility was good there was no doubt about what they were, as their long tails were clearly discernible. I took out my watch and that flock kept passing over my head for fourteen minutes. I think if my father had been there (reluctant as he was to use the word millions) he would have broken his rule that time. I could plainly hear the rushing sound made by the wings until the birds passed out of sight.

"It was reported in one of the Detroit papers at that time that one of the largest nestings that had ever taken place in northern Michigan occurred in 1876. Whether

this flock arrived there or not I do not profess to know, anyway they were headed in that direction.

"After 1876 I saw only scattered flocks in different parts of Ontario from Walpole Island on the St. Clair River in the west to Marmora in Hastings county in the east.

"An uncle of mine who had a farm near Cherrywood, five or six miles north of Pickering on the Kingston road, told me that in the old days they had considerable trouble keeping the pigeons out of the grain fields. He also said that buckwheat seemed to be their favourite food among the different varieties of grain.

"In 1877 father and I were up at Coboconk on the Gull River and he shot a few pigeons during the month of September, which he said were young birds of that season. That is as far north as I ever came into actual contact with them.

"The Toronto Gun Club, which was incorporated in 1871, used quite a number of wild pigeons for their shooting matches, which were always shipped from Buffalo, and the last lot of wild birds that were used by the club came from that city during the month of June, 1880.

"During July, 1882, I spent a few days on the Trent River near Campbellford, and saw a number of pigeons flying back and forth across the river, but did not succeed in finding any trace of them in the woods on account of the dense foliage that existed at that time of the year. If the birds were young ones it is probable they were raised in that locality.

"After the breeding season was over the birds seemed to scatter over the country in small flocks. I have never heard much about their southward movement in the fall, and it seems obvious to me that they must have migrated at night as I never saw or heard of them leaving for their winter haunts in the day time.

"In September 1883, I was shooting woodcock in the vicinity of the Rouge River when I saw a pigeon flying overhead through the tree-tops, which I brought down and discovered that it was a female passenger pigeon in splendid condition. This specimen, the last I shot, was given to the late David Herring, but have no idea what ultimately became of it. Even at that time, nearly half a century ago, the end was apparently not far off.

"After that memorable morning in April, 1864, I was acquainted with the pigeons for 22 years, until July 4, 1886, when I saw the last male wild pigeon alive near Myrtle Station on the C.P.R. north of Whitby. When the train stopped to take water a male pigeon came to a small pond near the track to quench his thirst, and, after doing so, flew up to the fence and started to preen his feathers; then the engine started and I had my last look at a live wild pigeon."

Questionnaire used to collect information

ROYAL ONTARIO MUSEUM OF ZOOLOGY
BLOOR STREET AND AVENUE ROAD
TORONTO 5

WILD OR PASSENGER PIGEON IN ONTARIO

If you knew the Wild or Passenger Pigeon in the days of its abundance, please record as much information as possible about it AS YOU KNEW IT by answering the accompanying questions. Additional information not covered by answers to these questions is also desired. It is not necessary that you should answer all the questions; answer only those for which you have information FROM PERSONAL KNOWLEDGE. Do not give information obtained from books, magazine or newspaper articles, etc., but refer to all published information you know of in your answer to question 37.

If additional space is required for your answer to any questions use additional sheets, numbering your answers to correspond to the question numbers.

We owe it to future generations to leave them as full an account as we can of the Wild or Passenger Pigeon in Ontario. Accounts have been published of the pigeons as they occurred in parts of the United States, but it is earnestly desired that all the knowledge that still exists of this bird in Ontario should be preserved. If you did not know the pigeon, will you not help by referring us to persons who may be able to help us from personal knowledge.

Additional copies of the questionnaire may be had by applying to the Museum.

Name and address of person answering these questions.

RANGE

1. Give location of breeding colonies or pigeon roosts which were personally known to you.
2. How large were the colonies?
3. Have you any information as to how far north the wild pigeons were found in Ontario?

NESTING

4. Did the pigeons nest in the same nesting sites year after year?
5. Did they use these sites as roosting places after the nesting season was over prior to migration or did small flocks wander from place to place before migration was started?
6. Have you any knowledge as to the number of eggs usually found in a nest?
7. How close together were the nests built?
8. How far from the ground were the nests built?
9. In what kind of trees were the nests built?

10. In what sort of positions in the tree were the nests placed?
11. Of what material were the nests built?
12. Were the nests lined? If so, by what material?
13. How long did it take for the eggs to hatch?
14. How long after hatching before the young left the nest?
15. How many broods did a pair of pigeons raise in a season? (This may be suggested by the seasons at which eggs were observed in the nest.)

FOOD

16. What did the pigeons eat in the spring?
In summer?
In autumn?
17. Do you know what the young were fed?
18. Were the pigeons destructive to crops? If so, to what crops and at what seasons of the year?

MIGRATION AND NUMBERS

19. About what date in the spring did the pigeons arrive at points known to you? (If definite dates cannot be given, indicate time by reference to some seasonal happening, such as leafing of certain trees or planting of some crop).
20. When did they leave in the fall?
21. Describe the flight of the pigeon, mentioning any peculiarity.
22. Describe the arrangement of the flocks in migration. Were they uniformly distributed or were there smaller flocks, separated from other flocks by open spaces? (Illustrate by diagram.)
23. To what extent did their numbers vary from year to year?
24. Was the increase or decrease in their numbers regular? If so, about how often did large pigeon years occur?
25. Were any animals noticed to be more numerous in "pigeon years" than when pigeons were scarce?

DESTRUCTION

26. Did they appear to have any natural enemies?
27. Have you any knowledge of diseases or epidemics among them?

28. To what extent in your locality were they killed for food, sport or other purpose?
29. Were they killed for sale? If so, where marketed and at what price?
30. Give some indication of the numbers so marketed.
31. By what means were they caught or hunted?
32. Do you know of anyone who has a pigeon net such as were used to catch wild pigeons?

MISCELLANEOUS

33. In what ways were they prepared for the table?
34. Was any use made of the feathers?
35. Mention any other use that was made of the pigeons.
36. Describe the call, song or notes of the wild pigeon.
37. Do you know of any newspaper, magazine or other published account of the pigeon or of any letters, diary or other written record of them? Give reference.
38. When was the last pigeon seen or killed in your locality?
39. Give names of persons who have mounted specimens of the pigeon.
40. Give names of other persons who may be able to give information on the pigeon.

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