more so than the darkest individuals seen in the interior of the province, and young taken there vary from dark to the extreme of paleness seen in the juvenile.

Ixoreus nævius nævius. VARIED THRUSH.—Scarce breeder (Green). *Okanagan Landing, B. C.*

SOME ASPECTS OF THE GROUP HABIT AMONG BIRDS.

BY CHARLES L. WHITTLE.

IN the way of preface and to anticipate the criticism likely to be made by anyone reading the following article that the rather meagre data brought forward scarcely warrant discussion, I wish to say that my purposes herein are to assemble such detailed information as I possess, some old and some possibly new, in the hope that the matter will stimulate the search for new facts bearing on the questions discussed, and to speculate somewhat on the import of the observations thus far made.

Viewed in a large way, each species and race of birds during the mating season,—say of the Song Sparrow and the Fox Sparrow, the former nesting throughout the United States, much of Canada and part of Alaska—is in reality a large colony. Between the regions occupied at this season by the many recognized races of the Song Sparrow are zones of intergrading, geographical forms. It is self evident that such races and intergrades could not have arisen and could not survive were it not true that the individuals composing them, or their descendants, occupy, in a greatly preponderating way, the same regions year after year. Were it otherwise, were the different races to mix indiscriminately together or with the transition forms, the races would be extinguished and become one species by the swamping effect of the resulting intermatings. The various factors, such as relative humidity, amount of sunshine, temperature, etc., believed to originate geographical races, would be impotent to effect changes in species were the bird population continually shifting its nesting area. It therefore seems certain that such races and their intergrades as a whole must return each year to their approximate nesting places of the

previous season, and can accordingly be regarded in the first instance as a racial group, such a group occupying an immense area in the case of the Eastern Song Sparrow, (*Melospiza m. melodia*) or relatively only very limited areas in the case of the Kenai and Yukatut Song Sparrows (*Melospiza m. kenaiensis* and *caurina*), the eastern race occupying an area of 1,500,000 square miles more or less, the Alaskan races, referrred to, occupying areas of hundreds of square miles rather than thousands, or even much less in the case of a California race of Song Sparrow.[1] It is quite easy to think of these latter races as constituting racial colonies; but the term applied to *melodia*, though equally accurate, has the distinction of being unusual.

The occurrence of smaller and more restricted colonies of nesting birds are of course too numerous to mention. Examples are Puffins, Murres, Cormorants, etc., among the less specialized species; Bank, Tree and Eave Swallows, Short-billed and Long-billed Marsh Wrens, etc., among the more differentiated species.

That many birds return each year to the approximate nesting place of the year before has now passed pretty well out of the realm of speculation. That this is so has long been a popular belief. And now comes experimental confirmation derived from the records secured from banding birds on their nesting grounds. Many birds, and probably most birds do this instinctively and both young and old often return not only to the approximate locality but to the identical place of their nativity. This instinct, in so far as it ensures the movement of birds in migration from their winter quarters to their nesting places, seems closely allied to if not identical with the homing instinct displayed by the Homing Pigeon in returning to its dovecote, and by the cat and dog in returning to their homes when forcibly removed for considerable distances. It does not, however, explain so readily the migration away from their nesting places, but probably the southern movement in the summer and fall had its origin in the lessening food supply in the nesting areas.

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[1] An alternative view has been advocated that these intergrading zones are due to hybridism between adjoining races arising from the mutual encroachments of each race upon the territories of its neighbors, by dispersal from centers of origin.

In fact, how else shall we interpret the common experience that among many species of birds only such part of their nesting area is deserted by them in winter as normally fails to furnish the necessary food supply? Add to this the testimony of the well-known habit, possessed by some usually non-migrating birds, of becoming migratory only when a shortage of the food supply makes such migration obligatory. Any tendency in this direction would have had a selective value, and this tendency has now become an instinct. To us, however, many birds seemingly migrate an unnecessary distance to their winter homes, but this may be explained by remembering that the instinct may have been perfected at a time when climatic conditions made such migration necessary.[1]

At this writing (January 28), we have at our banding station in Cohasset a group of seven White-throats, adults and immature birds, which have been coming to the feeding shelf for a month or more. They often come one, two, or three at a time, or towards nightfall, the whole group appears. They eat liberally, and then as a small unit they fly into some white pines nearby for the night. If they were not fed, they would have to move south or perish on account of the deep snow. This condition of affairs indicates that it was lack of food on their breeding grounds that gave rise to the instinct to migrate in the fall.

The problem of why birds migrate in the spring is probably older than the systematic study of ornithology and of course there is no hypothesis yet proposed that is acceptable to every one. It seems to me, however, that the homing experiments made with untrained Noddies and Sooty Terns perhaps shed some light on the problem.

The instinctive devotion of the parents for their young (the parental instinct), without which our highest animal life would

[1] Two recent banding records in Cohasset are worth recording as perhaps indicating that birds leave their home (nesting place) with reluctance even under weather conditions of great severity. A Song Sparrow "repeat" is reported by L. B. Fletcher. This adult bird, banded July 6, 1922, No. 28070, was retaken January 14 and again on January 28, 1923, at the same place. During the latter half of December and all of January the ground was covered deeply with snow and food was difficult to obtain. Still the bird stayed on refusing to migrate. This case has a bearing on the theory that among migratory species the local nesting birds move south and their places are taken by more northern birds. In New England one swallow is usually sufficient to make a summer and perhaps this wintering sparrow may be a straw that has told us which way the wind blows.

quickly pass away, represents probably the beginning of the instinct which later became the homing instinct. Certainly any feeble beginnings of the parental feeling among organisms would have been of survival value to the race, and would accordingly be likely to be perpetuated selectively. Under normal conditions these birds while nesting, particularly when feeding their young, often travel miles from their nests in search of food for their family. In the course of time the frequent returns to the nest became extended and intensified so that they came to include the annual migration to the nesting ground, not always to the exact spot perhaps, but to the nesting locality, with the result that in the spring migrations of an individual, race or a species, we seem to have merely the elaborated parental instinct at its maximum, for the two movements appear merely to differ in degree rather than in kind. Where shall the line be drawn between the instinct that directs Noddies and Sooty Terns to their nests in the summer from a point 850 miles away, and the instinct that directs an adult bird in the spring to its nesting place of the year before, or a young bird to the place in which it was born only ten months previously, whether the distance be one hundred miles or several thousand miles? Homing Noddies and Sooty Terns (*Anous stolidus* and *Sterna fuliginosa*), in going from Cape Hatteras in North Carolina to their nesting ground at Bird Key, Florida, in traveling across hundreds of miles of territory they never saw before, display the same kind of instinct that is displayed by birds of the year in migrating from the place they were born to their first winter home, in that both have to traverse unknown lands. For an account of the homing experiments with these birds see 'The Behavior of Noddy and Sooty Terns,' by John B. Watson in 'Papers from the Tortugas Laboratory of the Carnegie Institute of Washington,' Vol. II, (1908 (1909), pp. 187–225. What is more to be expected than that the old home—the nest, the young and the immediate environment with their pleasant associations—should be the magnet which draws the birds instinctively from their winter quarters when nesting time approaches?

It is of course patent that many species do not move from their summer to their winter quarters and back again in a body. It is also common knowledge that they do not as a rule migrate singly.

Some species assemble in mixed flocks during both spring and fall movements, but in such flocks it is not infrequently true that some one species largely predominates so that perhaps the remainder may often be considered as stragglers. On the other hand, there are certain species, particularly among the Fringillidae, Mniotiltidae, etc., which often and perhaps usually, migrate both north and south in groups of varying size. Examples of this class coming under my own observations are Myrtle and Yellow Red-poll Warblers (*Dendroica coronata* and *D. palmarum hypochrysea*); Ruby-crowned Kinglets (*Regulus c. calendula*); White-throated, Golden-crowned and Harris's Sparrows (*Zonotrichia albicollis, coronata* and *querula*); Fox Sparrows (*Passerella i. iliaca*); etc.

Everyone much afield in the winter time has witnessed the general tendency among many species to group themselves in small flocks. Such flocks probably become migrating units when spring comes. The organization and history of these flocks and the part they play in the biology of the species remains uninvestigated A beginning, however, is being made in this directon by winter bird banding, and this method of study, when properly organized and systematically prosecuted, promises results of great scientific value. Reference will be made below to some of the data already obtained by this method of attack, observations having to do with the group habit among birds both in their winter and in their summer habitats. There is also some evidence that there exists something like orderly procedure in such migrating bodies and that there may be definite groups having perhaps family or neighborhood relations which constitute migratory units. This certainly appears to be true in some instances (see below p. 237, albinistic Sharptails). Moreover, it is probable that the routes followed in detail by such groups in moving both north and south are more or less permanently traveled. In addition there are occasional observations which indicate that groups of birds, as well as individuals, have a summer nesting area and also a more or less fixed winter residence and that the fixity of the winter home is probably determined, other things being equal, by the amount, the kind, and the dependability of the food supply at such places. No doubt birds move about over their normal winter range, or even may wander far therefrom according as food is scarce or plentiful, but if groups

of birds find an ample supply at any given place, they are likely to return to the same spot, if within their normal winter range, year after year (see results of bird banding in this connection below). Mr. S. Prentiss Baldwin's records made at his banding station near Thomasville, Georgia, show interesting examples of this kind. Here, about his house, which is close to his all-the-winter feeding places, a small group of White-throats has lived in a very limited area as a group or colony, "in the same patch of shrubbery at the end of the house," winter after winter, namely, from 1915 to 1922, omitting the winters of 1918 and 1919 when the station was not operated, as a group of six to twenty-one birds Conjecture and unsupported belief as to the facts are eliminated in this case by definite proof obtained by retaking banded White-throats during five years out of the eight years that the station has been operated. Mr. Baldwin states it as his belief (see 'The Auk,' vol. XXXVIII, pp. 236–237) that these birds, which he calls a "neighborhood group," winter as a group, migrate north and south as a group, and as a proposition to be proven he believes the birds nest as a group. There are additional observations which confirm some of his conclusions and lend support to his most important proposition.

It appears certain that the dependability and abundance of the food supply at this point accounts for the presence of the birds in Thomasville year after year, but any similar bounty occurring naturally, as it often does, would no doubt be equally welcomed and equally patronized by such a group.

This station has also furnished in one season the astonishing record of twenty-nine "returns" of the Chipping Sparrow (*Spizella, p. passerina*) banded here prior to 1922 (see L. R. Talbot, 'The Auk,' vol. XXXIX, p. 344). The Chipping Sparrow, which does not nest south of central Georgia, accordingly occurs here as a winter visitant. There is no published analysis of the records of these returning Chipping Sparrows, but I prophesy that their history will run parallel to that of the White-throats in respect to group-wintering and in showing very local wintering range as a rule.

At this point it may be worth while to relate my experience with this species on its nesting ground in Peterboro, N. H. Several pairs nested in close association about a flower garden some fifty

feet from a house. In August, after the young were raised, the Sparrows all disappeared. On September 5, 1922, I was standing in the garden when from the north a flock of Chipping Sparrows suddenly settled down among the flower beds and about the house. Soon they flew into a hedge where a brood was raised that year, and others alighted on an elm and a cherry tree in the vicinity, trees much frequented during nesting time by this species. The flock, some twenty-five in number, was made up of adults and birds of the year. After resting for a time they as suddenly banded together and flew southward, I believe as a group of birds which nested in the congenial surroundings furnished by the shrubbery about the house and garden and which after moulting time returned to their home for a last glimpse before leaving the place for the season.

Among the banding records of the New England Bird Banding Association which Mr. A. C. Bagg made at his banding station at Holyoke, Mass. (in the Connecticut River valley) are some of particular interest at this time regarding the habits of the Tree Sparrow (*Spizella m. monticola*). Fifty-six individuals of this species were trapped and banded here during the winter and spring of 1922. These birds are referred to by Bagg as a "wintering flock." It is of great interest to note the happenings at this station during the following winter. On December 4, 1922, Bagg took his first Tree Sparrow return (22196), banded February 11, 1922. On December 11, two more returns of this species were reported (22188 and 22190), banded February 10, 1922. A fourth return was reported December 13 (22202), banded February 11, and on December 18 he had one more return (22198) and one more December 19 (21199), banded February 11, 1922. Writing on December 17, Bagg reports four "returns" still about his trap, indicating that a disposition exists to pass the winter a second time about this station, a place where satisfactory food abounds.

Considering the very limited number of trappers and banders in this country, who have thus far banded wintering birds for two successive seasons, and who, accordingly, have had no opportunity to obtain "returns" of their own birds, the amount of available evidence secured by banding, bearing on the group habit in migration and during the winter, is surprisingly great.

Of less interest, but still suggestive, is the prevalence of small groups of Tree Sparrows always observable in the region where this species winters. Such groups seldom contain more than twenty-five birds. An example of this kind came under my frequent observation during the winter of 1920-21 in the outskirts of Boston, Mass. A small flock of thirteen birds confined themselves within very narrow limits in the Arnold Arboretum from December to March. These birds were seen many times during the winter and were believed to be the same group on all occasions since the number remained so constant. At the time of leaving in the spring the flock had shrunk to twelve birds.

For over a decade in Great Britain, banding ("ringing") of nestlings has been practiced and to a limited extent adults have also been trapped. Sufficient data have been secured to warrant the statement that there is a marked tendency for certain British species of birds, both adults and young, to return to their nesting grounds of the previous year. Some of the evidence will be shown by the following data: H. F. Witherby (personal communication) writes that a Willow Warbler (*Phylloscopus t. trochilus*), No. F, 21, ringed June 26, 1911 as a nestling, returned in 1912 to the same spot and was found June 18, sitting on six eggs; and another nestling of the same species (No. J. 619), ringed June 15, 1912, was taken at the same place in 1913 on May 4th. Fourteen nestling Song Thrushes (*Turdus p. clarkei*) have been taken, usually the next year after being banded "at or near" the same place, and twenty-one Blackbirds (*Turdus m. merula*) were similarly retaken at or near the same place they were banded as nestlings. The exact meaning, however, of "near" is not quite clear in several instances, but the returns in the cases cited have always been made in the same township.

The case for Great Britain is summed up by Howard ('Territory in Bird Life', p. 281) as follows:—

> "That the older birds return to the locality wherein they had formerly reared offspring, and the younger to the neighborhood of their birthplace, was always deemed probable. But in recent years evidence which cannot be rebutted has been supplied by the marking of birds. This evidence, details of which can be found in the summary of results published an-

> nually by Mr. Witherby in 'British Birds,' demonstrates that the adult frequently returns not only to the same locality in which it formerly bred, but even to the same station; that it does so year after year; that this mode of behavior is not peculiar to sex; and that many of the young breed in the locality in which they were reared."

Commenting on this custom, Howard (p. 50) says that this habit ensures uniform distribution and is therefore of benefit to the race It also gives the assurance of suitable places to nest—and on the average, the kind and quality of the necessary food at the critical time of feeding the young birds in the nest. Moreover, the custom gives rise to local groups possessing elements of permanence. It does more than this, for the habit leads to isolation or semi-isolation according as the groups are widely scattered, due to the infrequency of suitable nesting conditions; or close together, due to the great abundance of suitable nesting conditions, closely spaced. The Eastern Song Sparrow exists under the latter conditions and the Pacific coast races of *Melospiza* have arisen under the former conditions. Not only so, this habit strongly indicates that however imperfectly organized the groups may be, some degree of isolation must result. Since the homing instinct exists and is believed to be demonstrably the cause of birds returning each year to the nesting ground of the previous year for breeding purposes, the presumption that family groups also exist, and this independently of any collateral evidence, is strongly indicated. Some ornithologists writing a decade ago, and the same views are frequently met with even at the present day, assert that the evidence indicates that it is the adults that return to their nesting places rather than the young birds. Taverner ('The Auk', vol. XXI, p. 331) states that "it seems universally true that young birds do not often return to breed in the immediate vicinity of the place where they were raised." If this were the case, it would be necessary to explain why birds are more likely to return to a place after an absence of one or more years than after an absence of less than one year. However, the practice of banding nestlings, in Great Britain at least, as shown above, establishes the fact that many young birds do so return. Taverner refers to the failure of the young to return as a "dispersal influence,"

and Grinnell ('The Auk,' Vol. XXI, p. 373) believes that "Nature . . . resorts to all sorts of devices to insure the spreading of individuals over all the inhabitable regions." This would mean that the races of say the Song Sparrow would be wiped out by swamping if the individuals of each race were to spread into the "inhabitable regions" occupied by the other races, for it is no doubt true that suitable nesting localities, for, say the Sooty Song Sparrow, exist immediately outside its nesting range and within the ranges of other races of Song Sparrows. That they do not do this is pointed out by the same writer in these words: "we never find two 'sub-species' breeding in the same faunal area . . ." (ibid. p. 373). On account of the strong disposition to return to the old nesting ground, it seems to me that the tendency among the individuals of the resulting family group is to remain together, other things being equal, until increase of numbers from any cause forces expansion of the nesting area. It is believed that because of these little groups, occurring even well within the nesting area of a species, natural selection, acting upon variations of a survival value arising therein, may often prove effective.

As illustrating an apparent case of song variation in a group of birds, the following facts may be of interest:

A number of Purple Finches (*Carpodacus p. purpureus*), nesting sbout a group of farm houses near the village of Peterboro, N. H., were observed to sing an elaboration of the usual simple warbling song of this race as I hear it sung throughout New England. This song variation consists of a pause at the close of the warble, followed by four (sometimes six) more ambitious slurred notes that may be rather accurately anglicized by the words "de-ar Ma-rie" or "de-ar, de-ar Ma-rie." These notes are rather slowly uttered, the first two or four being on one note and the last several tones higher. Whether or not this variation is sung by this race elsewhere I do not know, but it is reasonably sure that so far as this section of New Hampshire is concerned it is very infrequently used if at all. In 1920, four nesting males sang the variant, in 1921, three birds were heard doing so; and in 1922, seven birds did so. These birds have therefore occurred here as a well-marked group for at least three years and they all nest within an area estimated at twenty acres. Their peculiarity of song points to

their being a family group, resident here in the summer, and on the whole, increasing in numbers. If, accompanying the variation in song, there is also a physical variation that gives them an advantage over their neighbors of the same race, and the number continues to increase, we may expect dispersal to take place with the probability that birds singing this song variation may come to occupy a large area in course of time to the exclusion of the parent form. Dr. Brewer states in 'North American Birds' (Baird, Brewer & Ridgway, vol. 1, p. 463) that seven pairs of this species nested together harmoniously one summer as a group about his grounds in Hingham, Mass., two pairs even nesting in the same tree.

At this point 'The Condor' for November-December, 1922, appeared on my desk and on pages 193 to 203 Richard Hunt has an interesting article on the "Evidence of Musical 'Taste' in The Brown Towhee." Hunt, suggestively enough, describes two examples of the Brown Towhee (*Pipilo crissalis crissalis*) elaborating his own simple song *at its end* by adding in one case part of the song of the Western House Wren (*Troglodytes aëdon parkmani*), and in the other case adding "a perfectly good chirp of the Linnet" (*Carpodacus mexicanus frontalis*). In this connection Hunt writes at some length on the origin and purpose of bird song, considering these two variants of the Brown Towhee's song as imitations and concluding that it is by imitating other bird's songs that the evolution of bird song takes place. He regards the fact that these two "off" songs, sung many miles and three years apart, being so remarkably alike as indicating that a "racial rather than an individual tendency is at work" (p. 194). Referring again to the Peterboro Purple Finches, it should be mentioned that while I cannot trace with certainty their elaborated song to an imitation of any other bird's song, it possesses a form suggesting a portion of the song of the American Goldfinch (*Astragalinus tristis tristis*). The accordance of the manner the Brown Towhee and the Purple Finch elaborate their songs, calls for special mention in that the same order obtains in each case.

Hawkins ('The Auk,' Vol. XXXIX, p. 53), in writing of sexual selection and bird song, concludes that "wherever a variation appears in a single individual in its song that variation seems to

vanish in its offspring but wherever there is a variation which is common to a group of individuals that variation appears to survive in succeeding generations," and he raises the question if this apparent law is the true biological background of the origin of races and species. On page 51 Hawkins restates the law and here his meaning of the word "group" is more definitely given, thus: "In the east a variation may occur now and then in an individual but is lost in succeeding generations, while in the west where the variation occurs in a group of birds it survives with the result that a new subspecies evolves."

It is interesting in this connection to note the occurrence of a group of Ruby-crowned Kinglets (*Regulus c. calendula*), occupying many thousand square miles in the western part of Montana, which sings a marked variation of the eastern Ruby-crown's song (see A. A. Saunders, 'The Auk,' Vol. XXXVI, pp. 525-528). Another instance of local song variation came to my attention in August, 1922, at Wrangel, Alaska. A thicket of Devil's Club (*Falsia horrida*) close to the ocean harboured three or four Song Sparrows, presumed to be *Melospiza m. rufina*. These birds are not believed to differ from this race in plumage or in size, but they used a series of most un-Sparrow-like, scolding notes not heard by me from others of this race which I encountered in several places on Kupreanof Island, forty-six miles northwest, and not used by any other race so far as I know. Several times on approaching their retreat one of the birds would emerge at the top of the Devil's Club and pour out a torrent of rapidly-uttered, protesting notes which resembled nothing so much as to quality as the scolding notes of the Western Winter Wren (*Nannus hiemalis pacificus*). These birds were singing freely and their song was recognizably similar to that of *melodia*, but at times the quality seemed somewhat different. On occasions, they repeated their song over and over in a kind of unemphasized warble, with only infrequent slight rests, for fully a minute and a half. I have no knowledge of the extent of the area occupied by the birds possessing these local peculiarities. The area may be very local, as is the case with the Peterboro Purple Finches above described.

Another example of a well-marked group or colony of presumably non-migrating birds, the Santa Cruz Chickadee (*Penthestes ru-*

fescens barlowi) has been noted by J. Grinnell (see 'The Condor,' Vol. XXIV, pp. 182–183). These birds are described as living as a "well-established and rather far sequestered colony" in a tract of Monterey pines, having an area of several square miles, situated near Cambria, California. The nearest area of these trees to this isolated tract of pines is at Point Sur some seventy-five miles away, and as far as known, there are no Santz Cruz Chickadees in the intervening territory. In a personal communication Grinnell quotes Mr. Dixon as stating that in an area of these pines of one square mile situated south of Cambria he actually saw about twenty of these birds of which five were collected. These, according to Grinnell "averaged paler, nearer white on the mid-ventral surface" than comparable members near Monterey, noticeable differences which, however, he does not regard as constituting phylogenetic significance. This varietal form is presumably the product of its environment and should be regarded as a color phase which in the course of time may become a race, and ultimately perhaps a species. Our immediate interest in the matter, however, is that it is the isolation due to the exceedingly local distribution of the Monterey pine (*Pinus radiata*) which has given this particular environment sufficient time to effect the changes described, and that this would be the case, though perhaps more time would be required, were the Chickadees migratory but still subject to the instinct to return each year to the same nesting grounds. Any group of birds composed of a single species or race nesting under conditions of isolation and giving rise to mutants or variations of selective value would be similarly favored provided the isolation were as complete; and in whatever degree isolation is obtainable through the action of the homing instinct in giving rise to family or neighborhood groups, then in just that degree is this instinct a force operating to bring about the evolution of races and species. One naturally raises the question: if indeed variations occur among family groups from time to time, first here and then there, what part such variations play in giving rise to the "puzzling intergrades," unnamable forms and "incipient local forms" noted by species splitters.

The most interesting observations, apparently bearing on the existence of nesting groups, have come from another source and

this a most unexpected one. In 'The Auk' (Vol. XXXVIII, pp. 604–605 and Vol. XXXIX, p. 265), A. T. Wayne describes the finding of albinistic Sharp-tailed Sparrows (*Passerherbulus caudacutus*) for twenty-two consecutive years at the same locality near his home at Mount Pleasant, South Carolina, the seasons being in the fall or winter. He describes the occurrence thus: (p. 605) "This strain of albinism in the Sharp-tailed Sparrow has held uninterruptedly year after year in this little realm, which embodies only a few acres of high land. . . . Since 1900, I have taken about twenty-five Sharp-tailed Sparrows on this little piece of land, all of which showed albinism in a greater or less degree, and all taken exhibited the black spots on the abdomen." Such an occurrence of albinism is of great physiological interest in itself, but in the present case another aspect of the matter needs investigation, namely, what were the conditions under which the supply of albinistic birds at this place originated? This race of Sharp-tails is not known to nest further south than Virginia; they are accordingly migratory in South Carolina during the fall and winter seasons. Wayne's record of birds taken stands at about twenty-six individuals while others were seen by him.

Albinism is an hereditary character. The occurrence of such birds here so regularly may be explained by assuming that they migrated from scattered places of origin and segregated here in winter quarters as a group. I believe this to be an improbable explanation because it takes no adequate account of how a constant supply originated or the constancy of the black spots on the abdomen. A second hypothesis is that these birds constitute a small wintering group which is also a nesting group, and this view explains, I think, the source of supply and the peculiar abdominal markings and leads to speculations of a much more general interest as well, particularly whether or not the groups of birds of a single species which are commonly seen during the spring and fall migration, groups which bird-banding data indicate winter often as groups, also nest as groups, that is, return year after year to the same spot or to the same locality to nest. Some of the evidence that certain groups do return to their nesting grounds of the previous year has already been given. But, while there are only a limited number of direct observations indicating that such groups

do return, I raise the question if the constant supply of albinistic Sharp-tailed Sparrows, occurring for a consecutive period of twenty-two years at a given locality in its winter quarters, does not in itself inferentially constitute a strong presumption that such birds were raised where inter-matings with the normal Sharp-tails were of so infrequent occurrence that swamping did not take place. A small group of albinistic sparrows by interbreeding year after year and migrating to the same spot to pass the winter would satisfactorily account for the phenomenon observed.

Mr. Wayne on one occasion saw as many as three such birds together and he collected twenty-five birds in all, each showing albinism, and all having black spots on the abdomen. We do not know how long the Sharp-tail lives or the ratio of surviving young to those which perish from one cause or another, but it is a fair presumption that the number seen plus those collected by Mr. Wayne during a period of nearly a quarter of a century constitute perhaps not over ten per cent. of the birds actually born during this time. Whatever the ratio may be, the source of supply, the manner in which this supply reached its winter quarters and returned, constitute problems of very great interest. It is, I believe, more than a coincidence that this protracted case of albinism should occur in a species whose nesting places are restricted to salt marshes. By hypothesis a group of this species, capable of keeping up the supply of albinistic birds required, would more easily survive intact than if the albinism occurred among some other species less insistent on particular nesting localities, for the distribution of salt marshes, in the nature of the case, is such that nesting places are occasionally wide apart, thus giving rise to the semi-isolation needed to enable such a group to maintain itself without danger of contact with normal birds at nesting time.

It seems certain that the constant supply of these birds for so long a period could only have been maintained by a family group whose integrity remained unimpaired during this time. If this view of the matter is correct, it of course follows that any inheritable variation arising within such a group would have a like chance tobe perpetuated and perhaps to become the nucleus of a race or species, and this must be true, in particular, where the home of a family group at nesting time coincides with complete isolation such

as the Santa Cruz Chickadees enjoy, or the semi-isolation, due to the scarcity of nesting localities, which for example, the Song Sparrow often finds on the Alaska and the California coasts (see below).

In studying a map showing the nesting range of different species of land birds today in the United States east of the Mississippi, it is profitable to attempt to picture the nesting range, say of the Song Sparrow as it existed here prior to, let us say, the year 1700. From our knowledge of the kind of nesting localities chosen by this species we shall at once realize that the primeval forests of two hundred years ago which covered a large part of its present nesting range, especially the coniferous growth, harboured relatively few breeding birds. Such a picture would doubtless be correct and the explanation is not difficult: primeval forest conditions make for paucity of numbers of this species by limiting the nesting localities. Limiting the number of nesting localities, on account of the homing instinct, introduces favorable conditions for the perpetuation of local variations and such mutants as arise, the fewer the number of localities and the more widely they are separated from one another, the more easily races and species, caeteris paribus, may be evolved. Conversely, the greater the abundance of such localities and their proximity to one another, the greater the probability that the type will persist. The Eastern Song Sparrow with its enormous range and constancy of character is the product of the latter condition; the numerous northwestern, Pacific coast races of *Melospiza* are the products of the former order of conditions, there spread out before the observer in the most illuminating manner.

In considering the nesting localities of North American birds from the point of view of bird groups, we must try to realize something of the ever-changing conditions that of necessity occurred throughout the immense past. British Columbia and Alaska, along the coast, are in one of the phases of that primitive condition. An observer is at once impressed on going there by the solid forests of conifers which cover the mountans up to several thousand feet and descend nearly everywhere to the ocean's edge and extend northwest for over a thousand miles. The decrease in deciduous growths as one goes northward is also very marked and this decrease is represented more and more by very local occur-

rences of such plants. Theoretically, therefore, we ought to find more constancy, i.e., fewer race variations among species inhabiting the coniferous forest than among those species whose nesting localities are restricted to more or less open deciduous growths of trees and shrubs occurring occasionally along streams or the shore, such as small aspens, willows and alders, and this is what we do find. The easterner will not fail to note the fact that such patches of willows and alders are often miles apart in certain sections and occur as small thickets situated notably at the upper ends of little bays where a small stream often enters. Here the Song Sparrows nest, perhaps in family groups, and their distribution is just as local and just as isolated as the thickets themselves. Moreover, these patches of deciduous growths are only able to exist because in the close and complex competition for the occupancy of such areas, between the conifers and the non-conifers, the latter are best fitted to do so, and such adjustment is relatively of a very permanent character (probably often existing for centuries in Alaska) in primitive regions where man has not been continually destroying nesting localities in some sections and creating new ones in others.

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THE MOURNING DOVE (ZENAIDURA MACROURA CAROLINENSIS) AT PANORA, IOWA.

BY L. L. SNYDER.

Plate XV

THE following paper records the present status and some of the habits of the Mourning Dove (*Zenaidura macroura carolinensis*) in the vicinity of Panora, Iowa, with special reference to a nesting pair which exhibited either peculiarities, or, if typical, behavior not usually recorded. Panora is in the center of an agricultural district, the region to the north and east being a rich, level prairie, while immediately south and west of the town the Middle Raccoon River has cut its course along the terminal morraine of Iowa's last glacier. This rugged section is more or less wooded, but