The condition in which the bird's rear toe was hooked around the tarsus was always found after the birds had been confined in a burlap bag awaiting banding. It is possible, therefore, but doubted, that this was a temporary condition associated with handling of the birds.

SUMMARY

A total of 8,285 Brown-headed Cowbirds (7,537 males and 748 females) were examined during the winter trapping in Alabama in 1960-61. Externally visible abnormalities were found on 292 males and 29 females, an incidence of 3.9 percent of each sex. The following abnormalities were noted: pox and flesh mite nodules, scaly leg, cyst in submucosa of cloaca, broken and deformed legs and toes, recurved toenail, bill deformities, rear toe hooked around tarsus, punctured eyeball, and partial albinism.

ACKNOWLEDGMENT

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BANDING OF MIGRANT THRUSHES IN ALMIRANTE, PANAMA

By Pedro Galindo, Eustorgio Mendez and Abdiel J. Adames

The role of migratory birds in the dissemination of arboviruses between widely separated geographical areas has been the subject of speculation for many years. However, aside from circumstantial evidence, practically no experimental data has been produced to back this hypothesis.

For the last four years Gorgas Memorial Laboratory investigators have been conducting a long-term research program on the ecology of arboviruses in Almirante, Republic of Panama. As part of this program, studies were planned to clarify the role of some northern migratory birds in the introduction or dissemination of arboviruses to and from the study area. Observations during the first two years indicated that some northern avian species migrate from and to the North in very large numbers through Almirante during the Fall and Spring, while others remain in Almirante for several months as

winter visitants. In view of the large number of species that fill both of these categories, it was decided to limit the studies at first to a few species, selecting them on the basis of number of specimens available and practicability of capture methods. Four closely related species were selected to represent migrant birds, namely, Swainson's Thrush (*Hylocichla ustulata*), Gray-cheeked Thrush (*Hylocichla minima*), Wood Thrush (*Hylocichla mustelina*) and Veery (*Hylocichla fuscescens*). The Catbird (*Dumetella carolinensis*) was picked as the only representative of the winter visitants.

The immediate objectives set for these studies were as follows:

1) To determine whether arboviruses can be demonstrated circulating in the blood of birds during migration.

2) To demonstrate by serological conversion in individual birds arbovirus infections acquired in the study area by winter visitants.

3) To study the migratory pattern of the various species being investigated.

The study calls for the mist-netting of as many individuals of the chosen species as possible. Captured specimens are bled from the external jugular vein, banded and released. Investigations are to be conducted on a year-around basis in order to find the extreme range of migration in the species being studied. The present report covers ornithological findings through the first year of observations on the migrant thrushes.

Description of the study area — The study area is a quadrangle some 5 miles long and 2 miles wide extending North from the outskirts of the town of Almirante, Bocas del Toro province, in the Republic of Panama. The area encloses a variety of habitats including freshwater marshes, swampy lowland tropical rain-forest,second-growth, banana groves, cacao orchards and grassy pastures. In view of the observed habits of both thrushes and catbirds to remain in the open, most of the nets were placed along open fields or in light second growth vegetation with only a few of them crossing dense second-growth patches, primary forest, cacao orchards or banana groves. Climatic conditions in the study area fall under the category of "tropical rainforest climate" according to the Koppen system of climatic classification, with heavy rainfall fairly evenly distributed throughout the year. As a consequence there is no marked dry-season in contrast to the Pacific watershed of Panama.

Methods — A method similar to that reported by Stamm *et al.* (1960) for surveying wild bird populations by mist-netting and banding was employed in these studies.

Four plots were selected to sample the population of thrushes (See Figure 1). Plot "A" was selected in the "Two-Mile" sector adjacent to the rail-road line. This plot is located in a small abandoned cattle farm, mostly covered by grass reverting to second growth in various stages of development. To the North the plot encloses a hill covered by thinned-out lowland tropical rainforest. Plot "B" was located just off the "ball ground" on the edge of the "One-Mile" sector of

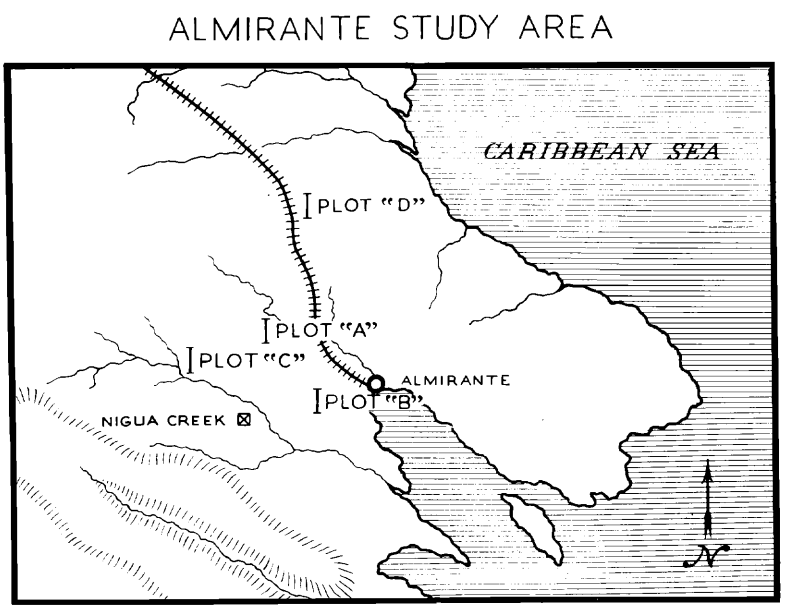

Figure 1. Map showing study area.

Almirante. This plot consists of an open field of short grass crossed by two drainage ditches and bordered by second-growth thickets of thorny bushes. Plot "C" was selected on the Bocas-Chiriqui road about two miles to the Northwest of plot "B". It is an area densely covered by tall second-growth bushes where tanagers, sparrows, grassquits and thrushes abound. Plot "D" was located in an open field bordered by banana and cacao plantations near the "Five-Mile" railroad station, some three miles to the North of plot "A".

Nets were extended in each plot at 100-foot intervals along two 1000-foot lines which intersected at right angles at their midpoints. In order to cut "net-shyness" down to a minimum, all nets along each line were moved 30 feet in the same direction every two weeks, reversing the process once a month. Because of unavoidable delays in obtaining bands and nets, netting operations were not begun until October 10th, 1962 when the Fall migration of thrushes had already started. From October 10th through October 21st nets were set out only in plots "A" and "B". On October 22nd additional nets were opened in plot "C" and on January 4th operations were extended to plot "D".

Each net line was cared for by one man who removed all birds that became entangled in the nets under his care. Birds of no concern to these investigations were immediately released. Specimens to be bled and banded were placed in black-cloth bags about 12 x 15 inches in size. Usually no more than six birds were placed in each bag, although during the peak of the Fall migration it became necessary to crowd as many as 10 birds into a bag. However, this practice was soon abandoned as some mortality was noted under these over-

crowded conditions. Bags with birds were picked up by a man on horse-back at approximately one-hour intervals and carried immediately to the field laboratory located in front of the "Two-Mile" post beside the railroad line. At the field laboratory each bird was examined, identified and banded by one of the authors. After banding, specimens were handed to a technician who made a blood-smear from a foot of the bird and drew a sample of no more than 0.5 cc of blood from the external jugular vein. The bird was released immediately afterward. No mortality was observed in specimens thus handled. Bands were supplied by the Patuxent Wildlife Research Center of the U. S. Fish and Wildlife Service. Nets used were Japanese nylon mist-nets "Type-A: four-shelf, 12-meter" obtained from the Northeastern Bird-Banding Association. Nets were opened between 6:30 and 7:00 a. m. and closed after 6:00 p. m. During periods when thrushes were known to be most active (7:00-10:30 a.m. and 4:00-5:30 p. m.) nets were checked without interruptions, while during the midday slack period intervals of as long as 45 minutes elapsed between net checks. From October 16th through October 31st and from April 1st through April 30th nets were operated every day; the rest of the year nets remained closed two days a week, except for the Christmas-New Year holidays when nets were not in operation during the entire week.

Results — Table I summarizes the total number of birds banded and recaptured during the Fall of 1962 and the Spring of 1963. As may be noted, four species were banded during the Fall migration. Of these Swainson's Thrush was the commonest with 1279 specimens banded, followed by the Gray-cheeked Thrush with 264, the Wood Thrush with 84 and Veery with 38. During the Spring migration the picture changed as only two species appeared and these in considerably smaller numbers. Swainson's Thrush with a total of 365 specimens yielded a catch less than one-third that of the Fall. The five Wood Thrushes trapped in the Spring represented about one-sixth the catch of this species in the Fall. Gray-cheeked Thrushes, fairly common during the Fall migration, failed to appear in the Spring, as did Veeries which were represented by only 38 specimens in the Fall.

TABLE I THRUSHES BANDED AND RECOVERED 1962-1963

Species	Fall Migration			Spring Migration		
	Banded	Repeats	Retakes	Banded	Repeats	Retakes
Swainson's Thrush	1,279	12	0	365	19	0
Gray-cheeked Thrush	264	3	0	0	0	0
Wood Thrush	84	5	0	5	0	0
Veery	38	0	0	0	0	0
Totals	1,665	20	0	370	19	0

TABLE II. THRUSHES CAPTURED AND BANDED BY WEEKLY PERIODS DURING 1962-1963

Species	Fall Migration																
	October				November				December				January				
	8-14	15-21	22-26	29-4	5-11	12-18	19-25	26-2	3-9	10-16	17-23	24-31	1-7	8-14	15-21	22-28	29-4
Swainson's Thrush	203	388	441	146	54	21	9	10	1	2	4	0	0	0	0	0	0
Gray-cheeked Thrush	0	67	156	26	7	1	5	2	0	0	0	0	0	0	0	0	0
Wood Thrush	0	4	13	10	8	10	14	7	2	2	0	0	8	3	3	0	0
Veery	0	4	22	10	1	1	0	0	0	0	0	0	0	0	0	0	0

Species	Spring Migration																
	February				March				April				May				
	5-11	12-18	26-4	19-25	5-11	12-18	19-25	16-1	2-8	9-15	16-22	23-29	30-5	6-12	13-19	20-26	27-2
Swainson's Thrush	0	0	0	0	0	0	0	19	116	97	52	66	15	0	0	0	0
Gray-cheeked Thrush	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Thrush	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0
Veery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table II attempts to establish the pattern of migratory flights for each of the species during the Fall and Spring. The beginning of migration could not be determined as captures began when the Fall flight was already underway. Population peaks during the Fall were reached by all species about the third week in October, although the peak was less pronounced for the Wood Thrush than for the other three species. Veeries disappeared from Almirante during the second week in November. Gray-cheeked Thrushes became scarce early in November but a few continued to show up until 30 November, when the last specimen was captured. The bulk of Swainson's Thrushes arrived in Almirante during the month of October but stragglers continued to appear in the nets until 21 December when the last one was taken. Wood Thrushes, as mentioned before, never reached a pronounced peak. They began arriving on the 16th of October and a slight peak was reached in the 3rd week of that month, thence population densities appeared to level off until the last week in November when the decline started. Stragglers, however, continued to appear until 15 January when the last specimen was netted. No migrant thrushes of any species were captured at Almirante between January 15th and March 29th when several specimens of Swainson's Thrush were netted. The Spring population of this species reached a peak during the first week in April and gradually declined from then on until the last specimen was netted on 3 May.

As noted on Table I a total of 39 of the banded birds were taken again within 90 days after banding and were thus classed as "repeats". No "retakes", or birds recovered more than 90 days after banding, were recorded. Thirty-one out of the 39 "repeats" were Swainson's Thrushes; 12 of these were captured in the Fall and 19 in the Spring. Only 3 of the Gray-cheeked Thrushes banded were recovered in the Fall and 5 out of the 84 Wood Thrushes banded during the Fall fell in the nets again.

Table III presents the time elapsed between banding and recapture of the "repeats". As may be noted, of the 31 Swainson's thrushes recaptured, 11 or 35.5 percent were taken within 48 hours after banding and no specimen was captured more than nine days

TABLE III.

TIME ELAPSED BETWEEN BANDING AND RECAPTURE OF REPEATS

Days after banding	1	2	3	4	5	6	7	8	9	10	24	55	Totals
Swainson's Thrush	7	4	2	4	4	3	1	3	3	0	0	0	31
Gray-cheeked Thrush	1	1	1	0	0	0	0	0	0	0	0	0	3
Wood Thrush	0	0	0	0	1	0	1	0	0	0	1	1	4
Veery	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	8	5	3	4	5	3	2	3	3	0	1	1	38

after being banded. All three Gray-cheeked Thrushes recaptured were taken within three days after being banded. Two of the four Wood Thrushes recaptured were taken within the first week after banding; one was recaptured after 24 days and one after 55 days.

Discussion — While it would not be advisable to draw definite conclusions regarding the migration pattern of thrushes through Almirante until several years' data are accumulated, some theories may be advanced at this point. Questions also arise from the data presented above.

The fact that all of the "repeat" Swainson's and Gray-cheeked Thrushes were recovered within several days after being banded would seem to indicate that these two species pass rather rapidly through Almirante in migration, with few specimens remaining more than a few days. In contrast to this, the Wood Thrush appears to linger much longer, as indicated by the two "repeats" taken 24 and 55 days after banding. The fact that no Wood Thrushes were taken between 15 January and 29 March seems to indicate that even this species continues on to the South or West and that no individuals remain in Almirante during the entire winter. However, the length of time spent by this species in the study area would seem to point to nearby wintering grounds.

The fact that none of the Swainson's Thrushes banded in the Fall at Almirante were retaken in the Spring, poses the question of whether Fall and Spring populations of this species passing through Almirante may not form two distinct population groups with independent migratory patterns.

Failure of Gray-cheeked Thrushes to appear in the Spring also advances the question of whether this species follows a different flyway during the Spring than that taken during the Fall.

We recognize that we cannot expect large numbers of recoveries from birds banded as migrants. The numbers banded to date are a minute percentage of the populations of these species which pass through Panama. Also, the migrants have a wide choice of habitat, rather than being forced into constricted areas where returns or recoveries would be more frequent.

Answers to these questions will be forthcoming in subsequent years, when additional data is accumulated.

Summary — Studies are being conducted in Almirante, Republic of Panama on the migratory patterns of four species of northern thrushes, namely, Swainson's Thrush, Gray-cheeked Thrush, Wood Thrush and Veery. Birds were captured by means of mist-nets, banded and released. Results are given on the first year of observations. A total of 2,035 thrushes were banded and released during Fall 1962 and Spring 1963. Of these 1644 were Swainson's Thrush, 264 Gray-cheeked Thrush, 89 Wood Thrush and 38 Veery. While the data presented do not permit drawing of definite conclusions, they seem to indicate that Swainson's Thrush, the Gray-cheeked Thrush and the Veery are transient species in Almirante, while the Wood Thrush lingers much longer, but does not stay throughout the Winter, perhaps overwintering in nearby areas. Questions are raised

as to whether Fall and Spring populations of Swainson's Thrushes passing through Almirante are distinct with quite different migratory patterns and whether the Spring migration of Gray-cheeked Thrushes takes place through a different flyway than that utilized during the Fall.

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A NEW METHOD OF CAPTURE UTILIZING THE MIST NET

By J. E. JOHNS

During the Spring of 1961, it became necessary for me to capture alive a number of Wilson's Phalaropes (*Steganopus tricolor*) for the purpose of laboratory investigation of specific phenomena related to the well known sex reversal which these birds exhibit behaviorally and morphologically. These investigations were conducted at the University of Montana, and were supported by NSF Grant 678-3.

Since a minimum of 40 experimentals were required, and since Wilson's Phalaropes arrive in the Missoula, Montana area relatively late in Spring (earliest record May 3) and depart a short time later (except stragglers July or August), grassy ponds in the National Bison Range north of Missoula, which were known to harbor these birds during the breeding season were selected in advance as working sites.

It was decided that the method of capture most likely to meet with success would be by means of Japanese mist nets. These were stretched vertically on poles in shallow water along the edges of ponds in which birds were often seen to feed. Other nets were placed between adjacent ponds. It soon became apparent, however, that

Fig. 1 and Fig. 2

A. 2″ x 2″ stake driven into mud of pond bottom in selected site. (At least 3′ of stake protrudes above water surface).

B. Metal ring attached by cord to state (A) through which cord (C) from corner of mist net is passed.

C. Line attached to corner of mist net passed through metal ring (B) and attached to line (F).

D. Nylon mist net held parallel to and approximately 30″ above pond surface.

E. Lead split shot attached to all edges of mist net (D).

F. Single line attached to 4 corner lines (C) and leading to place of concealment.