BIRD-BANDING

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STUDIES OF SWALLOWS BY THE BANDING METHOD[1]

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IN view of the essential need of thorough knowledge of the habits of migratory birds, the Japanese government, which pays especial attention to the protection of wild birds, has been making minute investigations and collecting data on migratory birds by entrusting more than eighty schools, experiment stations, meteorological observatories, and lighthouse-keepers with the collection of the needed information for the solution of this important problem. Moreover, since 1924 the government itself has been carrying on bird-banding experiments with a view of contributing toward the solution of the same problem. The following list shows the number and species of birds banded by the Japanese government since that time:

In this report about swallows I will describe in detail the results of the banding experiments referred to in the above list.

There are three species of swallows migrating to Japan: *Hirundo rustica gutturalis* (Scopoli), Chimney Swallow; *Hirundo daurica nipalensis* (Hodgson), Mosque Swallow; *Hirundo javanica* (Sparm), Liu-kiu Swallow.

Of the above three species, the Liu-kiu Swallow inhabits only Loo Choo Archipelago, and thus is excluded from this report. As for the two other species, (see map) the former is the commoner in Japan, being distributed all over the country, whereas the latter principally inhabits the western part of the country, both nesting on the eaves or ceilings of human dwellings and godowns.

[1]The tabulated data of returns of banded swallows in my experiments I have already published in Japanese in a paper in *Chôjû Chôsa Hôkoku*, Vol. 6. I have therefore omitted them in this article, in order to avoid complexity, confining myself to describing only the results of the work.

Species of Birds	1924		1925		1926		1927		1928		1929		1930	
	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns	No. of Banded Birds	No. of Returns
Night Heron	130	8	333	23	199	1	208	3	451	24	629	18	1040	19
Ducks (10 sps.)	380	126	704	207	1095	125	1747	207	1885	242	2553	299	1619	324
Quail			315	7	561	9	787	6	975	55	1211	200	1404	229
Charadriidae (7 sps.)	174	7	102	1	1		11		42		199	2	186	10
Water-Hen			199	19	9	1	57	6	68	2		3	36	2
Brown-eared Bulbul	10	1	5		7		3						1	
Dusky Ouzel	1070	45	1012	5	1046	13	1885	16	2332	54	1866	57	2154	43
Pale Thrush	220	19	231	10	368	7	183	3	345	6	355	4	373	3
Eye-browed Ouzel	103	4	327	4	119	1	184		286	3	281	2	481	9
Emberiidae (17 sps.)	3880	62	4124	41	4461	45	7560	64	9229	83	9229	192	8657	229
Swallows	40		7		39		135		568	17	738	63	759	65

TABLE SHOWING NUMBER AND SPECIES OF BIRDS BANDED BY THE JAPANESE GOVERNMENT, 1924 TO 1930

3c/13
65-13

The bands used for swallows in Japan, shown in Fig. 1 are usually of aluminum and are 12 mm. long and 5 mm. wide, weighing about 6 centigrams.

In Japan two methods of banding are in practical use: one to capture and band the birds while sleeping at night, and the other to capture and band them in the daytime by netting at the entrance and exit of their nesting houses as they go in and out.

To ascertain the sexes when banding some skill is needed, so far as the Chimney Swallow is concerned, for the distinction is rather difficult. In the main, however, the principal points of discrimination are as below:

(1) The female generally has a slightly shorter tail than the male. The length of tail: female, 70-85 mm., 77 mm. on the average; male, 81-100 mm., 88 mm. on the average.

(2) The cloaca of the female is large and oblong, while that of the male is small and slightly projected.

(3) As for the colors of the under tail-coverts, forehead, chin, and throat, those of the male are brighter and more beautiful than those of the female. However, the distinction is but faint in young birds.

(4) The strength of twittering notes.

(5) It is the female only that sits on the eggs.

Let me now show the banding results in the form of returns obtained for four years, 1927-1930. The two species of swallows banded during the above period totalled 2136, of which 124 returned. The localities where they were banded were the seven prefectures of Aomori, Akita, Saitama, Toyama, Hyogo, Hiroshima, and Fukuoka.

The banding of swallows is exclusively done at their nesting-places, and their returns were noted at the localities where they were banded. They never came back to nest in localities other than those where they were banded. Accordingly, it is to be understood that the returns are only those birds which returned to the localities of banding or nesting. The following table shows the results of banding swallows by species for the period above mentioned for each prefecture by years:

FIG. 1, ALUMINUM BANDS FOR SWALLOWS USED BY THE JAPANESE GOVERNMENT

1927

Species	Prefecture	No. Banded	Adults	Sexes	Nestlings	Returns	Sexes
H. rustica	Aomori	3	0		3		
H. rustica	Saitama	20	17	9♂ 8♀	3		
H. rustica[1]	Hyogo	26	2	1♂ 1♀	24		
H. daurica	Hiroshima	24	4	3♂ 1♀	20		
H. rustica	Fukuoka	20	7		13		
H. rustica		42	8		34		

TOTAL
135, Adults 38, 13 males, 10 females
Nestlings 97.

1928

H. rustica	Aomori	47	18	12♂ 6♀	29	13♂ 16♀	
H. rustica	Akita	17	1	♀	16		
	Saitama	188	104	52♂ 52♀	84	10	5♂ 5♀
H. rustica	Toyama	20	3	1♂ 2♀	17		
	Hyogo	223	23	11♂ 12♀	200	2	1 Nestling H.J.G. 1♂ H.D.N.
H. daurica					14		
	Hiroshima	39	22	12♂ 10♀	17	4	Ad. 4 1♂ 2♀
	Fukuoka	20	2	2♀	18	1	Adult

[1]Initial letters of the two species banded.

TOTAL
568, Adults 173, 88 males, 85 females.
14 Nestlings H.D.N.
Nestlings 381, 13 males, 16 females.
Returns 17, 15 Ad. H. rustica, 6♂, 7♀,
1 Ad. ♂ H. daurica.

1929

Species	Prefecture	No. Banded	Adults	Sexes	Nestlings	Returns	Sexes
H. rustica	Aomori	86	16	{7♂ 9♀	70		
H. rustica	Akita	61	18		43	1 Adult	
H. rustica	Saitama	156	42	{19♂ 23♀	114	53 Adults	{28♂ 25♀
H. rustica	Toyama	30	12	{7♂ 5♀	18	1 Adult	♀
H. rustica	Hyogo	194	79	{38♂ 41♀	115		
H. daurica		106	47	{23♂ 24♀	49		
H. rustica	Hiroshima	26	13	{6♂ 7♀	13	8 Adults	{5♂ 3♀
	Fukuoka	79	18	{2♂ 16♀	61		

TOTAL
738, Adult H. rustica 168, 79♂, 101♀,
Nestlings 434.
Adult H. daurica 47, 23♂, 24♀.
Nestlings 59.
Returns 63. Adults 63, 34♂, 29 ♀.

1930

H. rustica	Akita	160	52		108	6 Adults		Remarks
H. rustica	Saitama	186	96	{41♂ 55♀	90	20 Ads. 19 Nestlings 1	6♂ 13♀	
H. rustica	Toyama	20	14	{6♂ 8♀	6	4 Adults	{1♂ 3♀	
H. rustica	Hyoga	250	60	{27♂ 33♀	190	7 4 Ads.	2♂, 2♀ H.J.G. 3 H.D.N.	2 adult, 1♂, 1♀. and 1 nestling
H. daurica	Hiroshima	30	8	{5♂ 3♀	22	5 Ads.	1♂, 4♀	
H. rustica	Fukuoka	49	15	{7♂ 8♀	32	2	2♂	
H. daurica		2	2	{1♂ 1♀				

TOTAL
697, Adult H. rustica 239, 81♂, 104♀.
Nestlings 426.
Adult H. daurica 10, 6♂, 4♀.
Nestlings 22.
Returns 44. 41 H. rustica.
40 adults, 12♂, 22♀, 1 nestling.
3 H. daurica, 2 adults, 1♂, 1♀.
1 nestling.

SUMMARY

Total Birds Banded, 2136

Aomori Prefecture	Adult H. rustica	136.	34 (19 males and 15 females) and 102 nestlings.
Akita Prefecture	Adult H. rustica	238.	71 (1 female) and 167 nestlings.
Saitama Prefecture	Adult H. rustica	550.	259 (121 males and 138 females) and 291 nestlings.
Toyama Prefecture	Adult H. rustica	70.	29 (14 males and 15 females) and 41 nestlings.
Hyogo Prefecture	Adult H. rustica	867.	164 (77 males and 87 females) and 529 nestlings.
	Adult H. daurica		59 (31 males and 28 females) and 115 nestlings.
Hiroshima Prefecture	Adult H. rustica	85.	42 (18 males and 17 females) and 43 nestlings.
Fukuoka Prefecture	Adult H. rustica	190.	43 (7 males and 26 females) and 145 nestlings.
	Adult H. daurica		2 (1 male and 1 female).

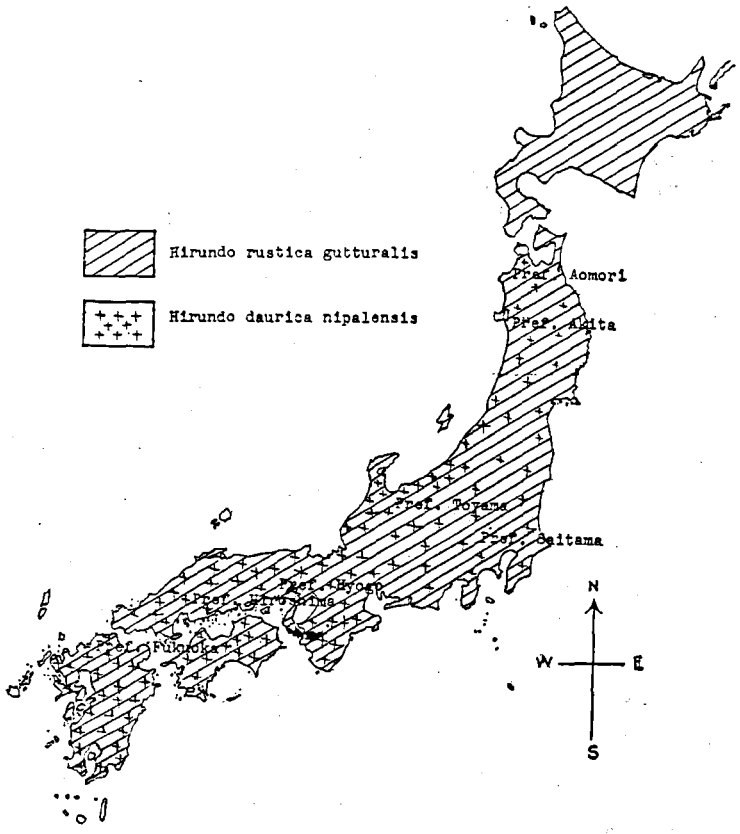
Returns, 124. Of these, 120 were H. rustica adults, comprising 52 males and 57 females. Four were H. daurica, 3 adults and 1 nestling.

The percentage of returns of adult birds as shown in the foregoing table, is as follows:

Percentage of Returns of Adult Banded Swallows

	Banded One Year Ago				*Banded Two Years Ago*		
	1928	*1929*	*1930*	*Average*	*1929*	*1930*	*Average*
Akita		100	33	67			
Saitama	59	49	24	44	12	9	11
Toyama		33	33	33			
Hyogo	33		5	13			
Hiroshima	57	36	31	41		5	5
Fukuoka	13		11	8			
Total Average				34			8

According to the above table, the percentage of returns averages 34 in six prefectures. But as returns in Hyogo and Fukuoka Prefectures have been excepted for the reason that the investigation has been inadequate, the average percentage in the other four prefectures—Akita, Saitama, Toyama, and Hiroshima—amounts to 46. In other words, about one half of the adult swallows banded return to the neighbourhood of their nesting places of the preceding year. The death-rate of swallows is generally considered exceedingly high because of their long-distance migration. We may safely conclude, however, that most of them are, as a rule, in the habit of returning to their breeding places of the preceding year in view of the results obtained as shown in the above table.



MAP SHOWING DISTRIBUTION OF TWO SPECIES OF SWALLOWS IN JAPAN

When we consider the localities where the banded swallows returned, we find that almost all of them return to places within the limits of the villages or towns where they lived during the preceding year, the majority returning even to the same houses where they nested the preceding year. In fact, out of the 124 examples of returned birds, those which returned to nesting-houses other than the ones occupied the preceding year were only 31. Two of them nested next door to their nesting-houses of the preceding year. There were 8 examples of swallows which returned to the same village or town for three consecutive years, and 3 of them even nested at the same houses for three consecutive years. With regard to the 31 examples returning to houses other than their old ones of the preceding year, when observed more carefully, it has been found that most of them, in spite of having returned to the same houses once, lost their mates or were compelled to choose other houses, owing to the repair, or some other condition of their old houses. It may easily be seen that swallws tend strongly to return not only to the same localities but also to the same houses occupied during the preceding year.

It is a very interesting question why so few nestling swallows return to their old nests. My banding work so far has resulted in a very small number of such returns, consisting only of the following three examples:

No. 36413 Chimney Swallow.
One of the 114 nestling swallows banded at Shichiri-mura, Saitama Prefecture, August 9, 1929, returned to Noda-mura, an adjoining village in the same prefecture, May 28, 1930.

No. E-50 Chimney Swallow.
One of the 24 nestling swallows banded at Uozumi-mura, Hyogo Prefecture, July 29, 1927, returned to the same village, May 30, 1928.

No. 48391 Mosque Swallow.
One of the 59 nestling swallows banded at Chigusa-mura, Hyogo Prefecture, June 28, 1929, returned to the same village, July 17, 1930.

That returning nestlings are so remarkably scarce may be explained by the fact that they seek new breeding places the following year without returning to their old homes, or to the extremely high death-rate of swallows during the first year. Be the answer what it may, after repeated banding experiments, one finds that very few swallow nestlings return to their old breeding places the succeeding nesting season, as indicated by the following facts: In various localities where banding experiments have been made in Japan the number of swallows breed-

ing there year after year shows no noticeable increase or decrease. Generally speaking, almost the same number of nests is yearly found at the various houses. Now, as the number of returning parent swallows is 46 per cent, as already mentioned, it is only natural to conclude that the number of returning nestlings is the remaining 54 per cent. According to investigations made by Mr. Tominosuke Nibe (*Chôju Chôsa Hôkoku*, Vol. 2; pp. 55, 62 and 63,) a pair of parent swallows hatch 7.01 nestlings as an average brood; in other words, one swallow generates 3.5 nestlings. Now, putting the percentage of the returned nestlings at 54 per cent of that of parent birds, we come to the conclusion that these nestlings which return to their old breeding places comprise only 13.1 per cent, it being presumed that the remaining 87 per cent have died or sought new breeding places in other localities.

Swallows which have returned for two consecutive years are very few. In Saitama Prefecture only two returned by 1929 out of those banded in 1927; nine returned in 1930 out of those banded in 1928; in Hiroshima Prefecture only one in 1929 out of those banded in 1927; and only one in 1930 consecutively for two years out of those banded in 1928—thirteen in all.

There has been no return for three consecutive years so far. It should be noted, however, that banding has been carried out for only four years, and the number of birds banded has not been very large. Although birds returning for three consecutive years may likely be discovered in future, it is considered that such cases will occur very seldom, if at all.

In view of the above observations, it may safely be concluded that whereas the death-rate of swallows seems to be rather high until they reach the age of a year, the percentage of returns the following year is highest in case of adult birds, reaching about half of all the birds banded; that the number of returns of three-year-old swallows is less than for two-year-old birds; and that returns of four-year-olds are exceedingly rare. From these considerations it may be presumed that the average life of a swallow is under four years.

Let us now look into the question of permanent mating in the case of the swallow. Whether in the East or in the West, various popular views in connection with the question of bird-partnership have prevailed since times of yore. Most of the authors of these traditions seem to consider birds in general to be quite chaste such as the tradition widely believed in Japan regarding the Mandarin Duck. Nevertheless, according to observations made by S. P. Baldwin, a pioneer in researches in reference to

the mating of birds[1] the House Wren in the United States of America, contrary to popular conjecture, commonly changes its mate every breeding season, examples of continuing relations with the same mate for two breeding seasons being found exceptional. In the case of other species Mrs. M. M. Nice writes in her paper, "Do Birds Usually Change Mates For The Second Brood?",[2] that "in the case of seven pairs of [North American passerine birds] there was a shifting of mates in one season, while in twenty pairs of eleven species there was no change."

As to the permanence of the mating relation among Japanese swallows an examination of sixty-four pairs which were banded showed that twenty-six pairs returned to the same nest-houses in the same mating relation as in the preceding year; there were no examples of the same mates returning to nest-houses other than those occupied by the same pair the previous year; those returning to the same nest-houses as in the preceding year with different mates were six males, nine females, and three others of unknown sex; and, finally, those returning to nests other than the ones used the preceding year and changing their mates, numbered eight males, eleven females, and one of unknown sex.

If the new mates of the swallows in the above number are carefully examined, it is found that all of them are not banded, or were banded later than in the year in which their old mates were banded. In other words, there is nothing to prove that exchanges of mates were made between swallows which were banded in the same year. Therefore it may be supposed that they have sought new mates because their old mates died or did not return to their old breeding places. The fact that all those who did not change their mates returned to the same nest-houses as in the previous year, not to other houses, as pointed out above, is also noteworthy.

As for those which changed their mates, eighteen of them returned to the same nest-houses occupied in the preceding year, and twenty to houses other than in the preceding year. With reference to the latter, it is considered that they had most likely been forced to abandon their old nest-houses, being tempted by their new mates to the latters' old nest-houses.

Is there any recognizable difference between the male and the female in attachment to their old nest-houses? It has been proved that out of those swallows which have changed their mates from those of the preceding year when they were banded,

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1S. P. Baldwin: The Marriage Relation of the House Wren, *Troglodytes ædon ædon*, *Auk*, Vol. XXXVIII, pp. 227-244, 1921.
2*Bird-Banding*, Vol. I; pp. 70-72, 1930.

those which returned to the same houses as in the previous year were five males and nine females, whereas those which returned to houses other than in the previous year, that is, those which may be considered to have been lured by their new mates, were eight males and eleven females. It is interesting to note that, in the cases both of those which returned to their previous houses and of those which returned to other houses than in the preceding year, the number of females was larger than that of the males. Judging from this result, it may be considered proved that the degree of attachment of swallows to their old nest-houses does not necessarily depend upon the sex.

As may be inferred from the above-enumerated facts, the swallow has a persistent homing habit; not merely does it return precisely to the locality where it nested in the previous year, but it is usual that the bird returns even to the same nest-house as in the preceding year. Consequently, a swallow ought to meet the same mate in the same nest-house as in the previous year, and naturally both of them nest and breed there, renewing their marriage relation.

However, in case of either the male or the female having died, the survivor may be compelled to seek a new mate, because of being unable to find its previous mate, in spite of returning to its old nest-house.

Of the male and female swallows which were banded after their sexes were ascertained, there are only five birds which nested for three consecutive years: three of them changed their mates in the third year, while the remaining two continued with the same partners for three consecutive years.

There has so far been only one instance of a banded Japanese swallow being recaptured in its hibernating[1] place. The record is important because it is unique so far as Japan is concerned. Place of banding, Notomura Hiki-gun Saitama Prefecture, (The middle part of the mainland of Japan). Date of banding, July 1, 1926. Place where it was recaptured, Lagna State, Luzon, Philippine Islands. Date of recapture, October 26, 1926.

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[1]In using the word "hibernating," Dr. Uchida doubtless has in mind our English word "wintering."

In his discussion of the two species of Japanese swallows he appears to treat both of them as a single species in writing of his returns. This, however, does not invalidate any of his conclusions since the number of *nipalensis* returns is negligible (3 out of 124), the conclusions having to do mainly with *gutturalis*.—EDITOR.