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Population Variation of Hill Mynah in Thailand

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Abstract: Previous studies classified morphological variants of Hill Mynahs in Thailand into five groups, including two well-recognized subspecies *Gracula religiosa intermedia*, the northern group and *G.r. religiosa*, the southern group and three new groups that represented intermediate characteristics. The degree of morphological variation among Hill Mynah population was studied in order to detect population dynamics of this species. Hill Mynahs were enumerated at 233 feeding trees of 93 study sites in 31 provinces throughout Thailand. Three new groups were found, intermingled with the northern and the southern groups, between 6° and 16°N which denoted the contact zone of the two original subspecies found in Thailand. The three new groups which were the interbred outcomes comprised 40% of the studied population and outnumbered their northern and southern counterparts which were 36 and 24%, respectively. Prior to 2002, the morphological variation of this species has never been investigated. If the interbreeding uninterruptedly continues, the population of the northern and the southern groups would tend to be eventually replaced. The trend of the population dynamics of this species in Thailand will change.

Key words: *Gracula religiosa*, population dynamics

INTRODUCTION

Among the ten subspecies of Hill Mynahs, *Gracula religiosa* found in Asia from India to China, Indonesia and the Philippines^[1] two of these are sedentary in Thailand, *G.r. intermedia* and *G.r. religiosa*^[2]. Empirical studies revealed that morphological variation had occurred among populations of Hill Mynahs in Thailand^[3-5]. They classified Hill Mynahs according to the variety of eleven external characters, especially the yellow wattle, into five groups, consisting of two known subspecies and three new groups, namely northern (N), modified northern (MN), intermediate (I), modified southern (MS) and southern (S). A further study also asserted that the morphological variation of Hill Mynahs in Thailand was due to interbreeding between the two recognized subspecies in the contact zone^[6]. The interbreeding proposition was supported by a specific study on chromosomes which disclosed the same sets of number and shape of 80 chromosomes among the five different groups^[4]. The mapping of the locations where each group inhabited in the nature to study the distribution pattern of these variable phenotypes showed that there were only the northern group inhabited between 16° and 20°30' N and only the southern group

inhabited between 5°30' and 6°N^[7]. Three new Hill Mynah groups were dominant between 6° and 16°N, the contact zone of two original subspecies and intermingled with the northern group between 9° and 16°N and the southern group between 6° and 9°N. To assess the degree of population variation of Hill Mynahs in the wild of Thailand, the amount of each of the five different Hill Mynah groups in flocks during nonbreeding season was investigated. This would indicate the degree of morphological variation among Hill Mynah population in Thailand and population dynamics of this species.

MATERIALS AND METHODS

Study areas: There were 31 provinces in Thailand between latitudes 5°30' and 20°30' N selected for assessing the number of the five Hill Mynah groups. The country was divided into six parts according to the habitats of the study groups (Archawaranon, 2002a). Part one was 16° to 20°30' N, where only the northern group was found. Part two was east of 12° to 16°N where the northern group (N) coexisted with the modified northern group (MN). Part three was west of 11° to 16°N where three groups (N, MN, I) were found. Part four was a complex zone of four groups: northern (N), modified

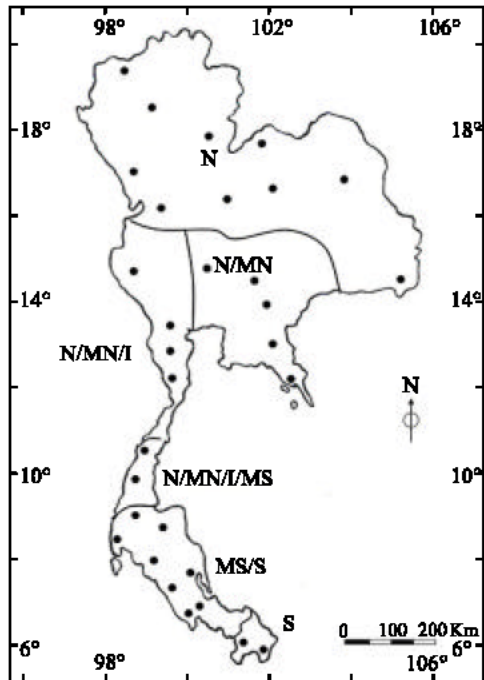


Fig. 1: Six parts of Thailand divided according to the habitats of five different Hill Mynah groups (● = 31 provinces)

northern (MN), intermediate (I) and modified southern (MS). In part five which was between 6° and 9° N, the modified southern group (MS) was found with the southern group (S). Lastly, part six was between 5°30' and 6°N and only the southern group inhabited (Fig. 1).

Composition in flocks: During nonbreeding season, which was from August to December of 1998 to 2000, each group of Hill Mynah was surveyed. In each of the six parts of Thailand, the number of flocks which had a combination of different groups was recorded at food sites during 06.00-11.00 h. and 15.00-18.00 h. In each province three sites were studied. At each site the data were obtained from two to three feeding trees. Each tree, was observed for two hours per day, was repeatedly recorded ten times in ten days. The data were collected by two individuals simultaneously.

Number in each group: Regarding the study of the composition in flocks, the number of birds from different groups in one flock at one time was recorded. Based on ten days' records from the two collectors, the average number of birds in each group was calculated by averaging from two to three feeding trees of each site and then from three sites in each province. The number therefore, was the number of birds in a flock per day.

RESULTS

The study of population variation of Hill Mynahs in Thailand was shown in two perspectives: composition in flocks and number of birds of each individual group in six parts of the country divided according to the habitats of five different groups: northern (N), modified northern (MN), intermediate (I), modified southern (MS) and southern (S)^[7].

In the area of part one, there were 64 feeding trees at 30 study sites in ten provinces. Only the northern birds were found in this area and so, the composition in flocks was completely homogeneous (Table 1).

In part two which was the habitat of two groups, the northern and the modified northern groups, there were 34 feeding trees at 15 study sites in five provinces. Composition in flocks was of two types: northern birds only and northern birds with modified northern ones. The proportion of flocks of northern birds only was higher than that of flocks of northern birds with modified northern birds (70.53%, Table 1). In this area, the northern birds were dominant and their number (61.60%) were almost twice as much as that of the modified northern birds (Fig. 2).

As for part three where three groups inhabited, northern, modified northern and intermediate groups, there were 35 feeding trees at 12 study sites in four provinces. Composition in flocks consisted of three types: northern birds only, northern birds with modified northern birds and northern birds with modified northern birds and intermediate birds. Flocks of northern birds with the two others were found most (52.51%, Table 1). In this area, the proportions of the three groups were relatively similar. (Fig. 2).

In part four which was the habitat of four groups: northern, modified northern, intermediate and modified southern groups, there were 17 feeding trees at six study sites in two provinces. Composition in flocks was of six types: northern birds only, northern birds with modified northern birds, northern birds with modified northern and intermediate birds, northern birds with modified northern, intermediate and modified southern birds, intermediate birds with modified southern birds and modified southern birds only. Flocks of northern birds with modified northern, intermediate and modified southern birds were found most (49.50%, Table 1). In this area, intermediate birds were the dominant group (34.73%, Fig. 2).

In area of part five which was the habitat of two groups: modified southern and southern groups, there were 66 feeding trees at 24 study sites in eight provinces. Composition in flocks was of three types: modified southern birds only, modified southern birds with

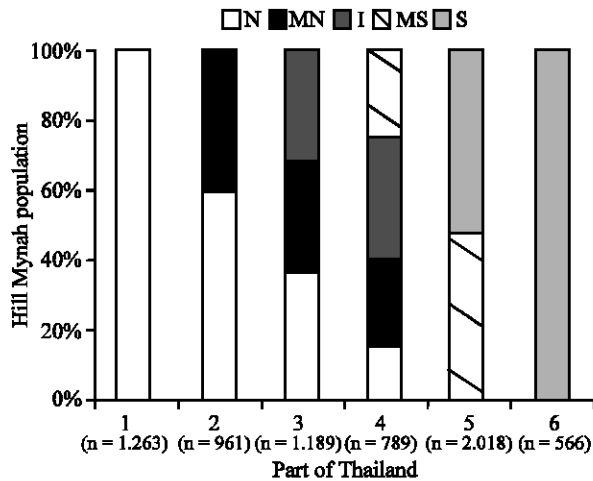


Fig. 2: Percentages of birds of each individual group in six parts of Thailand within ten days

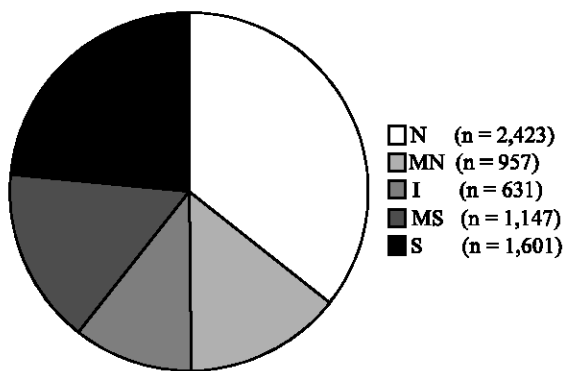


Fig. 3: Percentages of each individual group of Hill Mynah population in 31 provinces within ten days

southern birds and southern birds only. Flocks of modified southern birds, with southern birds were found most (46.69%, Table 1). In this area, the numbers of modified southern birds and southern birds were almost equal with 51.29% of the latter (Fig. 2).

In the last part, part six, there were 17 feeding trees at six study sites in two provinces. Only the southern birds were found here and thus the composition in flocks was unvaried (Table 1).

Population variation: Population variation had occurred in area of parts two, three, four and five (Fig. 2). However, when all study population from 31 provinces within ten days was totaled, the northern group was the most numerous (35.71%, Fig. 3) while the southern group

ranked second (23.59%). Although each of the three new groups, modified southern group (17.30%) modified northern group (14.10%) and intermediate group (9.30%), was smaller in number than the northern and the southern groups, when the population of all these groups were combined, it comprised 40.70% of the total population and outnumbered each group of the two original subspecies (Fig. 3).

DISCUSSION

There are two species of Hill Mynahs in the world: *Gracula religiosa* and *Gracula philogenys*. According to Peters^[1] there are ten races of *G. religiosa* distributed in Asia: *G. r. religiosa*, Linnaeus, 1758; *G. r. indica*, Cuvier, 1829; *G. r. intermedia*, Hay, 1844; *G. r. venerata*, Bonaparte, 1851; *G. r. andamanensis*, Beaven, 1867; *G. r. robusta*, Salvadori, 1887; *G. r. palawanensis*, Sharpe, 1890; *G. r. batuensis*, Finsch, 1899; *G. r. mertensi*, Rensch, 1928; *G. r. peninsularis*, Whitler, 1933. The differences among these races have been investigated in terms of size and wattle character. Most of these ten races have restricted ranges such as islands. They are geographically isolated from one another. Bertram^[8] mentioned that *G. r. intermedia* and *G. r. religiosa* were the most population of this species but no reports showed that the two races came into contact with or overlap one another.

G. r. intermedia inhabit northern India, southern China, Burma, Laos, Cambodia, Vietnam, northern and central Thailand^[9-11]. *G. r. religiosa* inhabit the southern part of Thailand, Malaysia and Indonesia^[12,13]. In 2002, there were several reports indicating that the morphological variation had occurred among Hill Mynah population found in Thailand where *G. r. intermedia*, northern bird's habitat contact with *G. r. religiosa*, southern bird's habitat. According to the eleven external characteristics of 749 live Hill Mynahs, especially body size and yellow wattle character^[5] there are three new Hill Mynah groups of which the characters are intermediate between two well-recognized subspecies^[3,4]. These groups which are found between 6° and 16° N of Thailand^[7] have occurred as a result of interbreeding between the two recognized subspecies: *G. r. intermedia* and *G. r. religiosa* in the contact zone^[8,14]. The two distinct subspecies: *G. r. intermedia* and *G. r. religiosa* evolved at a time when they were separated from each other by geographical barriers. Since reestablishing contact, they have freely interbred^[7]. In parts two, three, four and five where three new Hill Mynah groups stayed in

Table 1: Percentages of flock composition in 31 provinces within ten days

Part	Habitat of group	No. of flock	% Flock composed							
			N only	N with MN	N with MN and I	N with MN, I and MS	I with MS	MS only	MS with S	S only
1	N	232	100.00							
2	N/MN	190	70.53	29.47						
3	N/MN/I	179	20.67	26.82	52.51					
4	N/MN/I/MS	101	2.97	1.98	27.73	49.50	12.87	4.95		
5	MS/S	257						18.68	46.69	34.63
6	S	48								100.00

flocks with two original subspecies, flocks which consisted of varied groups in each area, were dominant, for example, in part three, flocks of northern, modified northern and intermediate groups were the most numerous (52.51%), whereas in part four, flocks of northern, modified northern, intermediate and modified southern groups were dominant (49.50%) and in part five, flocks of modified southern and southern groups were the largest (46.69%). The present study showed that the population variation of this species had noticeably occurred in the wild. In the study areas of 233 feeding trees at 93 sites in 31 provinces, the northern group was found most (36%), the southern group was the second most (24%). However, the variation from population of the two original subspecies was 40% of three new Hill Mynah groups found in the middle of the country.

Lekagul and Cronin^[15] reported only two original subspecies and did not mention about morphological variation of this species inhabited in Thailand. During the past 30 years, the variation of Hill Mynah population have gradually occurred. In the present study, the population of these three new Hill Mynah groups invaded into the habitats of the northern and southern populations, especially in parts two, three, four and five of Thailand (Fig. 2). Consequently, the population of the northern group decreased with distance from its stronghold: from part one (100%), part two (61.60%), part three (36.84%) to part four (16.48%). Along the same line, the population of the southern group decreased from 100% in part six to 51.29% in part five (Fig. 2). The variation of Hill Mynah population within 30 years, as evidenced in this study, is recognized on the ground that variation in wildlife species may occur anytime when the circumstances are available. In this case human impacts such as agricultural landuses, city expansion and forest cutting etc. tremendously harmed their habitats^[16]. Therefore, the two original subspecies were forced to invade each other's habitat which resulted in interbreeding. The specimen study of various Hill Mynah races at Bombay Natural History Society in Bombay, India in 1994-1996 did not find any of the reported subspecies resembled in wattle patterns to these three new Hill Mynah groups found in Thailand^[17]. It is, thus, not possible that any of known subspecies migrate to the contact zone. What will happen in the next

30 years? Although the degree of the variation of population in this study has not yet met the 75% rule to become a new subspecies or race^[18] they are free to continue interbreeding in the wild. The population of three new Hill Mynah groups will gradually increase especially in the west of Thailand where the forest is still in one substantial piece, unless geographical interruptions will again come to scene.

Although the 75% rule^[19] is still a question of obsolescence^[20-23] and may or may not be able to explain any new subspecies of this species in the future, this study showed the degree of population variation occurrence of this species and the possible trend of evolution of Hill Mynah.

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