

NEW SUBSPECIES OF GUNDLACH'S HAWK, *Accipiter gundlachi* (Lawrence)

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INTRODUCTION

Gundlach's Hawk, *Accipiter gundlachi* (Lawrence 1860), is a species endemic to Cuba, and may be considered as one of the rarest birds of our territory. This explains why it is very poorly represented in systematic collections, and its variability has been very little studied.

Ecological observations on this species started in 1983. The first studies published on this hawk (Wotzkow 1985, 1986) still did not allow the recognition of intraspecific variations. However, data obtained in the spring of 1985 suggested that the central-occidental and oriental populations of Cuba represented different taxa.

Examination of preserved specimens as well as live individuals; evaluation of the voice, based on sonograms; and the comparison of various characteristics of both populations, definitely showed that this species is represented by two geographical races; the nominative *Accipiter gundlachi gundlachi* from the occidental and central provinces, and another in the oriental provinces which we are describing in this paper, and which previously appeared in error under the name of *A. g. wileyi* (Meyburg, ed., 1987; Wotzkow, 1988 and Torres *et al.*, 1988) without the corresponding description.

MATERIALS AND METHODS

All available material (skins) of the species *Accipiter gundlachi* was examined, both in Cuban as well as in North American collections (n = 31) at the following institutions: Museo Nacional de Historia Natural (MNHN); "Juan Cristobal Gundlach" collection of the Instituto de Ecología y Sistemática de la Academia de Ciencias de Cuba (JGIES); Instituto de Ecología y Sistemática (IES); Museo "Felipe Poey" de la Facultad de Biología de la Universidad de La Habana (FPUH); Museo "Charles T. Ramsden" de la Facultad de Biología de la Universidad de Oriente (CRUO);

Museo de Historia Natural "Carlos de la Torre y Huerta" de Holguín (MCTH); Museo Polivalente "Ignacio Agramonte" de Camagüey (MIAC); Museo "Joaquín Fernández de la Vara" de Gibara (MJFV); American Museum of Natural History (AMNH); United States National Museum (USNM); Academy of Natural Sciences of Philadelphia (ANSP); Collection of Orlando H. Garrido (COHG); Collection of Carlos Wotzkow (CCW), and live specimens (n=10) listed in this paper.

The colours described in this study are based on notes taken of living individuals, with the exception of the description of the holotype.

All measurements are in millimetres.

In the differential diagnosis, the characteristics of the nominative subspecies appear in parenthesis.

DESCRIPTION

I propose to denominate the oriental populations which differ from the central and occidental ones of Cuba as:

Accipiter gundlachi wileyi n.ssp.

Accipiter gundlachi: Wattle 1973: 127 (part); Garrido & García 1975: 40 (part); Bond 1956:214 (part); Wotzkow 1986:111-114 (part); Reynard *et al.* 1987:73-77; Alayón 1987:2.

Accipiter gundlachi wileyi: Wotzkow in Meyburg 1987:3 (*nomen nudum*); Wotzkow 1988:3 (*nomen nudum*); Torres *et al.* 1988:1 (*nomen nudum*).

Differential diagnosis: A subspecies with the following characteristics: juveniles with a yellowish (greenish) cere, with the first transversal band of chest feathers not visible (visible); ventral feathers with very long longitudinal striations (short). Transversally barred thighs with a longitudinal band which connects the dark patterns of the apex to the first transversal bar of each feather (only lightly connected by the darkening of the rachis). Dorsal feathers with two large white patches (three smaller ones) (See Plate 1).

Sub-adults with very conspicuous slate-grey upper chest feathers (with terracotta tints mixed with the grey); feathers of the lower part of the chest and all of the abdomen with very narrow transversal bars in terracotta (wider transversal bars); thighs very thinly barred in terracotta (wider bars) (See Plate 2).

Adults with greenish-grey cere (dark grey) (Gundlach *in* Lawrence (1860) describes it as greenish yellow). All chest feathers of a very conspicuous slate grey (ferruginous grey); ventral feathers very finely barred with six terracotta

marks (with only four thick bars); thighs very thinly barred in terracotta in the inferior half of the feather and uniform terracotta in the upper half (completely terracotta with the apex trimmed in white); exterior tail feathers with four very small marks on the interior band to the rachis (with four bands or heavy marks including the exterior band); ash-grey back (darker) (See Plate 3).

Type locality: Yaguabo, Río Cauto, Holguín, Cuba.

Distribution: In the province of Camagüey, the bird may be located in some woods close to the north coast, and on Cayo Coco (Garrido 1976), Cayo Guajaba (Garrido *et al.* 1986) and Cayo Romano (Wotzkow 1988). It was recently reported in the proximity of the City of Camagüey (José Morales, pers. comm.).

In the province of Holguín it has been reported in the localities of Yaguabo, La Zoilita, Mayarí and Cayo Saetía (Torres *et al.* 1988). Within the province of Guantánamo, it has been observed in Las Munciones (Reynard *et al.* 1987), Cuchillas del Toa (Alayón 1987) and Canón del Calentura.

Although it has not been reported from the province of Santiago de Cuba, I assume that it is quite possible that it also inhabits the mountainous woods of the most oriental part of the Sierra Maestra, judging by the actual suitable habitats of these areas. In the province of Granma it has been studied in the forests of El Quemado and in Nuevo Yao (Torres *et al.* 1988).

Holotype: Adult male; Yaguabo, Holguín; March 26, 1972. No collector. Deposited at the (MCTH); study skin No. 6-1033.

Description of the holotype: Measurements: Length of bill (from nostril to billtip) 16.0mm; wings (from carpus to tip of the fourth primary) 242mm the right wing, 242mm the left one; tarsus (from joint to joint) 67.1mm the right one and 68.2mm the left one; hind claws, 21.3mm the right one, and 21.9mm the left one; central claws, 14.0mm the right one, and 13.2mm the left one; middle claws, 20.0mm the right one, and 20.6mm the left one; external claws, 11.9mm the right one, and 12.4mm the left one; tail (from its beginning) 195mm.

Colours: After having been preserved 16 years ago, and exposed to natural light (1972), this specimen shows some degradation in its original colours.

Black bill with yellow ochre tooth; black cere (greenish-yellow according to original label); upper part of the head darker than the back; all upper parts of the tail feathers grey with shades of light brown; cheeks grey; throat grey with the rachis brown, the feathers dark brown, but with lighter shades

towards the base of the bill; chest slate grey with the rachis dark brown and the apex of feathers of a tenuous olive green; belly transversally barred in terracotta; thighs profusely barred in terracotta, with small white markings; interior part of the tail feathers with three dark brown bands on a light grey base, the dark apex much deteriorated; tarsus and toes greenish, claws brown and iris reddish (according to original label).

MATERIAL EXAMINED

Accipiter gundlachi wileyi:

Juvenile female: Nuevitas, Camagüey; August 17, 1987; Collector Herminio Hidalgo; deposited at MCTH, study skin No. 6-1034.

Juvenile female: Cupeyal, Guantánamo; January 26, 1968; Collector Orlando H. Garrido; deposited at IES, study skin No. 1729.

Juvenile female; Gibara, Holguín; no data; deposited at MJFV on display, no number.

Juvenile female: no data; deposited at MCTH on display, No. 6-779.

Juvenile female: no data; deposited at MCTH on display, No. 6-75.

Juvenile female: La Zoilita, Holguín; March 13, 1988; Collector Jorge de la Cruz; deposited at CCW, study skin No. 22.

Juvenile male: Santiago de Cuba; Collector Charles T. Ramsden; deposited at CRUO on display No. 285.

Juvenile male: no data; Collector Charles T. Ramsden; deposited at CRUO on display, No. 286.

Juvenile male: Gibara, Holguín; no date; Collector Joaquín F. de la Vara; deposited at MJFV; on display; no number.

Adult female: Calentura, Moa, Guantánamo; April 29, 1986; no collector; in captivity, microzoo of Baracoa, Guantánamo.

Sub-adult female: Buey Arriba, Granma; April 20, 1985; Collector Zacharías Mayo Méndez; released in original forests.

Juvenile female: Buey Arriba, Granma; September 15, 1985; Collector Zacharías Mayo Méndez; released at Km 136 of the National Highway, Mantanzas.

Juvenile female: "Buena Vista" Ranch, Holguín; May 15, 1987; no collector; in captivity, private home at "La Candelaria", Holguín.

Adult male: Calentura, Moa, Guantánamo; April 29, 1986; no collector; in captivity, microzoo of Baracoa, Guantánamo.

Sub-adult male: Buey Arriba, Granma; April 20, 1985; Collector Zacharía Mayo Méndez; released in original forests.

Juvenile male: "Buena Vista" Ranch, Holguín; May 15, 1987; no collector; in captivity, private home at "La Candelaria", Holguín.

Juvenile female: Guantánamo; February 3, 1889; Collector Juan Gundlach; deposited at USNM, study skin No. 117752.

Juvenile female: Guantánamo, June 15, 1889; Collector Juan Gundlach; deposited at USNM, study skin No. 117753.

Juvenile male: Los Palacios, Pinar del Río (See Discussion); May 27, 1934; no collector; deposited at AMNH, study skin No. 763832.

Accipiter gundlachi gundlachi:

Adult female: Artemisa, Habana; March 24, 1944; Collector Gastón Villalba; deposited at FPUH, study skin No. 261.

Adult female: Artemisa, Habana; April 8, 1935; Collector Gastón Villalba; deposited at FPUH, study skin No. 262.

Sub-adult female: Artemisa, Habana; 1942; Collector Gastón Villalba; deposited at FPUH, study skin No. 263.

Juvenile female: Artemisa, Habana; February 2, 1950; no collector; deposited at FPUH, study skin No. 266.

Sub-adult female: no data; deposited at FPUH on display, no number.

Sub-adult female: no data; deposited at JGIES on display, No. 2036.

Sub-adult female: Cayajabos, Pinar del Río; no data; deposited at MNHN on display, no number.

Juvenile female: no data; deposited at CCW; study skin No. 23.

Sub-adult female: Artemisa, Habana; December 15, 1949; Collector Gastón Villalba; deposited at ANSP, study skin No. 160400.

Undetermined female: no locality; January 20, 1886; Collector Juan Gundlach; deposited at USNM, study skin No. 41128.

Adult female: Cayajabos, Pinar del Río; deposited at MNHN on display, no number.

Juvenile female: Sánchez Roig Collection; April 12, 1886; no locality; no collector; deposited at AMNH, study skin No. 763831.

Adult male: San Cristobal, Pinar del Río; February 21, 1944; Collector Gastón Villalba deposited at FPUH, study skin No. 265.

Juvenile male: Artemisa, Habana; March 24, 1944; Collector Gastón Villalba; deposited at FPUH, study skin No. 267.

Juvenile male: Artemisa, Habana; May 23, 1934; Collector Gastón Villalba; deposited at FPUH, study skin No. 268.

Sub-adult male: Laguna de Guanaroca, Cienfuegos; January 16, 1963; Collector Orlando H. Garrido; deposited at COHG on display, no number.

Sub-adult male: Casilda, Sancti Spiritus; January 22, 1963; Collector Orlando H. Garrido; deposited at COHG on display, no number.

Male: no data, deposited at JGIES on display, No. 2035 (See Discussion).

Juvenile female: Soplillar, Mantanzas; April 27, 1985; Collector Carlos Wotzkow; released in original forests.

Sub-adult female: Santa Bárbara, Habana; March 18, 1985; Collector Carlos Wotzkow; released on "El Quemado" mountain, Granma

Juvenile male: Soplillar, Matanzas; April 27, 1985; Collector Carlos Wotzkow; released in original forests.

VARIATION

The very conspicuous ventral stripes on the juveniles, dark brown on a white background, have a slight tendency to be wider and shorter in the individuals of Camagüey and Holguín. The typical stripes of the new taxon cover about two-thirds of the feather, fluctuating between 35 and 67mm; however, in all populations they clearly stand out against the very clear background. The sub-adults from the province of Guantánamo have a greyer chest and heavier terracotta thighs than the specimens from Holguín and Granma; the adults are definitely much greyer, including the flanks, than the specimens from the north of the province of Camagüey, especially all the birds analysed in the locality of Calentura (Orlando H. Garrido, pers. comm., and my own observations). The eggs of the new taxon obtained to date (Rams 1988) differ considerably from those described by Reynard *et al.* (1987), suggesting that the eggs of the oriental population show variations in colouration.

COMPARISONS

In the morphometry of juveniles in both subspecies, one notices a slight tendency in *A. g. wileyi* to be larger and somewhat less variable within the individuals analysed; however, the rather small size of the sample studied suggests that these data are insufficient to separate both races. There are high standard errors in the flight feathers (wings and tail), and the coefficients of variation are notably low in the variates of bill, wing, inner claw, central claw and tail of the females of the nominative subspecies, which may be construed as being due to the reduced size of the sample.

TABLE 1 Variates included in the study of juveniles of both sub-species

$$\bar{X} \pm \text{S.E. (C.V.)}$$

Variates	<i>Accipiter gundlachi gundlachi</i>			
	n	Males	n	Females
Bill	3	14,80 ± 0,702 (8,21)	5	17,58 ± 0,264 (3,42)
Wing	3	256,0 ± 3,888 (9,60)	6	263,6 ± 3,850 (3,56)
Tarsus	3	69,66 ± 3,223 (8,00)	6	74,21 ± 1,442 (4,74)
H. Claw	3	22,50 ± 0,777 (5,97)	3	25,86 ± 1,247 (8,34)
I. Claw	3	20,90 ± 1,015 (8,40)	3	24,60 ± 0,305 (2,15)
C. Claw	3	15,33 ± 0,491 (5,54)	3	16,70 ± 0,289 (2,99)
E. Claw	3	12,30 ± 0,264 (3,72)	3	14,36 ± 0,601 (7,24)
Tail	3	185,3 ± 4,338 (4,04)	6	218,3 ± 10,295 (1,50)
	<i>Accipiter gundlachi wileyi</i>			
Bill	4	15,05 ± 0,536 (7,12)	10	17,80 ± 0,314 (5,57)
Wing	4	247,5 ± 6,849 (5,53)	10	269,4 ± 3,543 (4,15)
Tarsus	4	70,02 ± 2,973 (8,49)	10	76,38 ± 1,126 (4,65)
H. Claw	4	24,17 ± 1,046 (8,65)	8	27,18 ± 0,370 (3,84)
I. Claw	3	22,96 ± 1,037 (7,80)	8	24,75 ± 0,484 (5,51)
C. Claw	3	16,63 ± 0,347 (3,61)	8	16,72 ± 0,598 (10,09)
E. Claw	3	13,23 ± 0,585 (4,40)	8	14,86 ± 0,192 (3,64)
Tail	3	188,6 ± 4,376 (4,01)	7	223,8 ± 5,375 (7,20)

The more outstanding morphological differences may be appreciated among the juveniles, although they also exist in the other states. Despite the fact that there are individual variations between both taxa, the ventral characteristics in the juvenile are clearly diagnostic.

Regarding their ecology, both races fairly coincide in their biotopes (forests), their diet (generalized ornithophagy) and in some aspects of their reproduction (situation of nest, territoriality and foraging behaviour). The difference found in the size of the clutch (See Table 2) and the manifest participation of the oriental male in the defence of the nest, are valuable constants when compared with the nominative subspecies. Due to the small number of nests studied ($n = 10$), the averages obtained in clutch size may not be a good estimate of the populations taken into account.

TABLE 2 Differences in clutch size between subspecies.

Subspecies	Eggs/Nest	f	Xh
<i>gundlachi</i>	3	3	2,25
	2	2	
<i>wileyi</i>	4	4	3,75
	3	1	

Note: A new nest of Gundlach's Hawk was discovered on the north coast of Holguín Province, on a tree of mangle (manglar). This is quite unusual, but the fact of having three chicks could be used in the analysis of this Table. Apparently the eclosion success was 100%, because there was no evidence of any other egg.

Accipiter gundlachi wileyi inhabits better-developed forests than the nominative sub-species which, in the central and occidental part of Cuba, occupies sub-montane evergreen mesophyllous forests of low heights and semideciduous marshy forests. However the new sub-species may be found in pine groves, cloud forests and tropical rain forests, and has also commonly been observed in dry evergreen microphyllous and riverside forests, surrounded by densely populated lands over which it flies in its daily foraging.

A comparison of song sonograms shows that both populations have a similar vocalization; however, the recording of an adult female in the Zapata

region definitely shows a much lower frequency in the main audible sounds.

Given the scant data from the occidental region (one female), it is difficult to establish the importance of the low frequency as a taxonomic factor (George Reynard, pers. comm.).

DISCUSSION

In the past, many investigators have confused the sub-adults and adults of this *Accipiter*; some of them even classifying the birds erroneously [Gundlach 1893; Conover 1946 in Wattel 1973; and specimen No. 160400 (ANSP)]. It is important to point out that there is one characteristic which permits differentiation between sub-adults and adults; the former exhibit conspicuous bars down to the lower half of the chest, while the adults present them uniformly over the whole of the chest.

Fortunately, Lawrence (1860) described the adult, the colours and patterns from the original description coinciding with those of an examined adult specimen of the nominative subspecies. Gundlach collected the individual that served as holotype in 1849 and, although this specimen could not be located, it was collected in Hanabana, within the distribution area of this race, which covers from East to West the forests of Escambray, the forests of Zapata Swamps and all of Sierra del Rosario. The deforestation that occurred during the 18th and 19th centuries seems to have fragmented this occidental population, leaving the province of Habana with scarcely any birds at all. However, during the decades of the 1930s and 1940s they could still be found in the vicinity of Artemisa, and an intensive search undertaken during 1985 and 1986 in the remaining forested areas to the South of Habana province, as well as the hummocks of Jaruco, led to the finding of one sub-adult individual in a riverside forest near Tapaste, a fact confirming the existence of isolated birds that could have been a population of continuous distribution in the past.

In the examined material, there are quite a few specimens with very deficient information, and some with none at all. Analysis of feather colours and patterns has served to corroborate the distribution in these zoogeographic areas. The American Museum of Natural History is the one most affected, since its only two specimens come from the collection of Dr. Mario Sánchez Roig. According to the experience of some investigators who knew Sánchez Roig and worked with him, the data attached to the specimens of his collection are not very reliable. The label of specimen No. 763831, a female, indicates that the bird is an adult (Mary LeCroy, pers. comm.), but it is actually an immature specimen of the nominative subspecies and its pattern corresponds with that of the population of western Cuba. Specimen No. 763832, a juvenile male, exhibits the typical patterns of juvenile individuals from the oriental provinces of Cuba. It is a peculiar coincidence that Specimen No. 763832 was collected on the same date that Gastón

Villalba collected his No. 268, while in his collection the female No. 264 is missing. It might be possible that the female in the AMNH was collected by Villalba together with the male No. 268 on the same day, and that the male No. 763832 is one of those collected by Gundlach during the date indicated on the label of the female (1886), a period when he collected quite a large number of birds in the oriental part of Cuba. However, we have excluded both specimens from any consideration.

Hellmayr and Conover (1949 in Bond 1956), classify ANSP specimen No. 160400 as an adult, but according to its pattern it is a sub-adult of the nominative subspecies.

Specimens No. 6-75 and 6-779 (MCTH), and No. 286 in the CRUO were assigned to the new sub-species in view of the above explanation.

Specimens No. 2034 and 2036 in the JGIES suggest that they belong to the nominative sub-species; furthermore, their patterns correspond with those of the birds from the occidental part of Cuba. The same situation occurs with the FPUH specimen without number. Specimen No. 2035 (originally No. 112 in Gundlach's collection) was erroneously included by Gundlach under *A. gundlachi*, instead being a male of *Accipiter cooperi* judging by its measurements. Because of the absence of any data, we abstain from drawing any conclusions on this matter, and therefore cannot officially report it as a specimen obtained in Cuba.

Finally, we would like to emphasize the opinion of Orlando H. Garrido when he observed for the first time a live couple of Gundlach's Hawk from the Calentura area, at present living in the microzoo of Baracoa. In March of 1987, these birds exhibited the sub-adult plumage (a stage unknown to Garrido from the eastern population), and he considered them quite different from the birds he had observed or obtained from the occidental populations.

This sub-adult stage is quite similar to that observed in individuals from the province of Granma, as well as those kept in captivity from Rio Yao and Buey Arriba, but differs in general from the nominative race.

Etymology: To associate this new taxon with the name of Dr. James W. Wiley is only just recognition of one who has contributed so enormously to the study of raptors in Cuba.

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of both taxa, and George B. Reynard, associate investigator of Cornell University, kindly provided us with them. Lester Short, Rosemarie Gnam and Mary LeCroy supplied the information on the specimens deposited in North American museums. Margarita Alvarodíaz took care of the birds while they were kept in captivity. René León and Ottón Suárez drew the plates that appear in this paper. Rogelio García and Zacharías Mayo Méndez offered decisive help in the field. Finally, Victor A. Wotzkow made the English translation.

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Audiospectrogram-originals prepared by Dr. W. John Smith, U. of Pennsylvania. Dept
Biology Philadelphia PA. Copies & ordinate by George B. Reynard

1. *Accipiter gundlachi*

File Number (GBR)

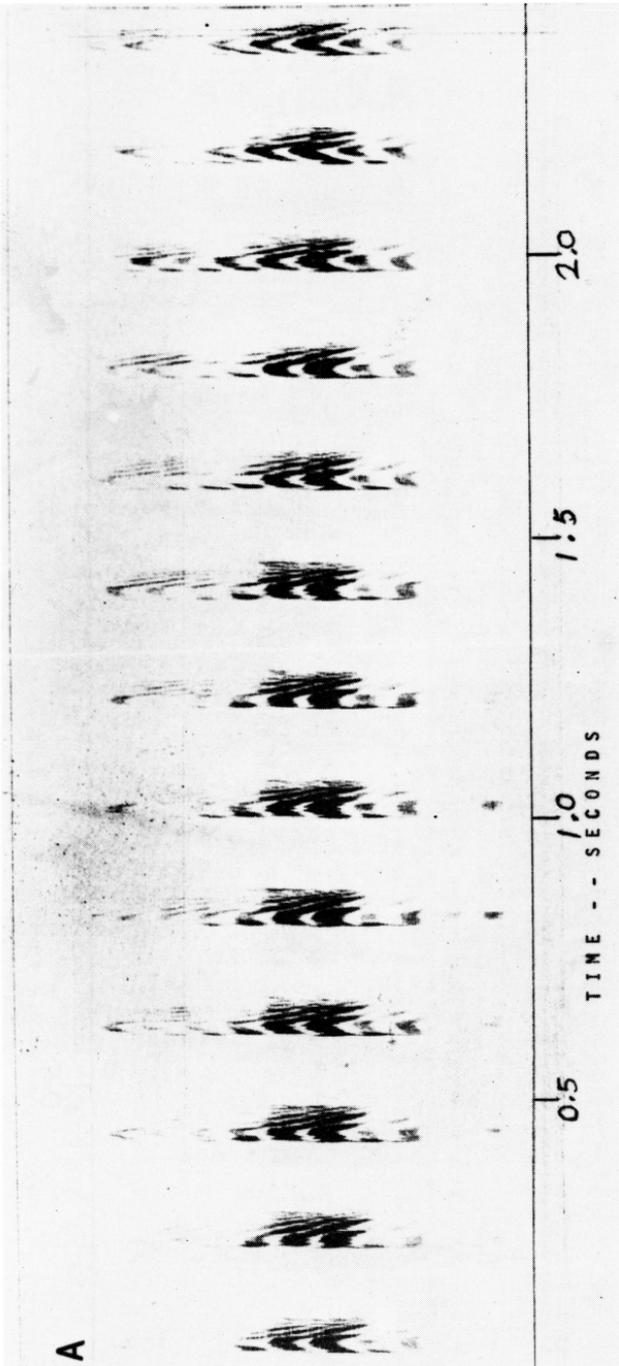
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|--|------------|--|
| A. CB 72-2 Series III female | 3 Mar 1985 | Las Munciones E. Cuba
G.B. Reynard |
| B. CB72-2 Series VII female | ditto | |
| C. CB72-2 Series XV (l. female. r. male) | ditto | |
| D. CB 72-3 Cassette index 53-60 female | April 1985 | Soplillar, Zapata, Cuba from
Video Cassette original obtaines
by a "Peruvian" and Carlos
Wotzkow, with guide Rogelio
Garcia A. |
| E. CB72-3 Cas. Index 83 85 female | April 1985 | as above |

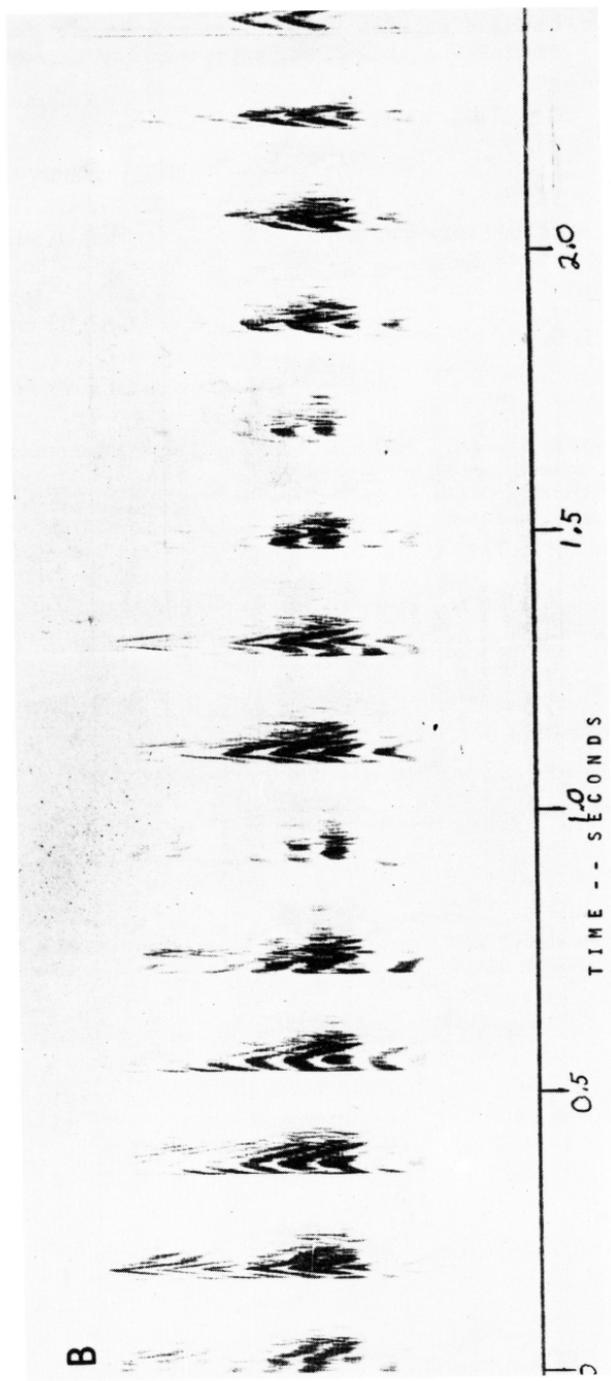
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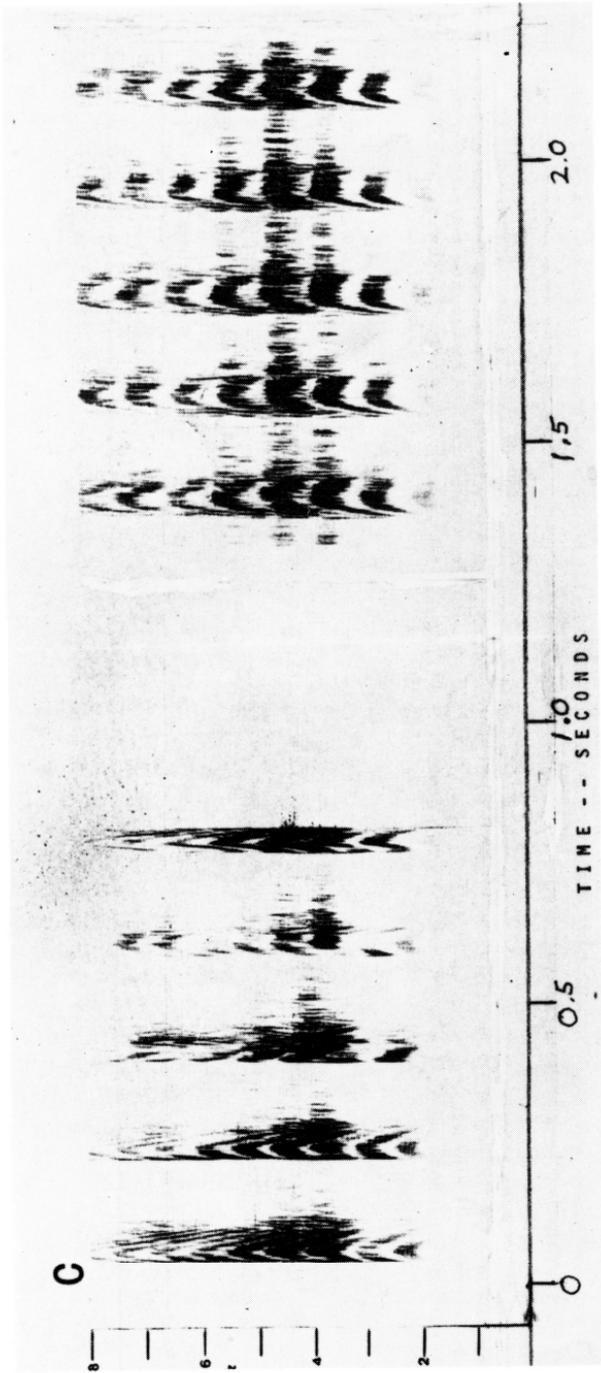
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| F. Cornell LNS # 18765 2A-3 female | 21 May 1977 | Arizona J.I. Gulledge |
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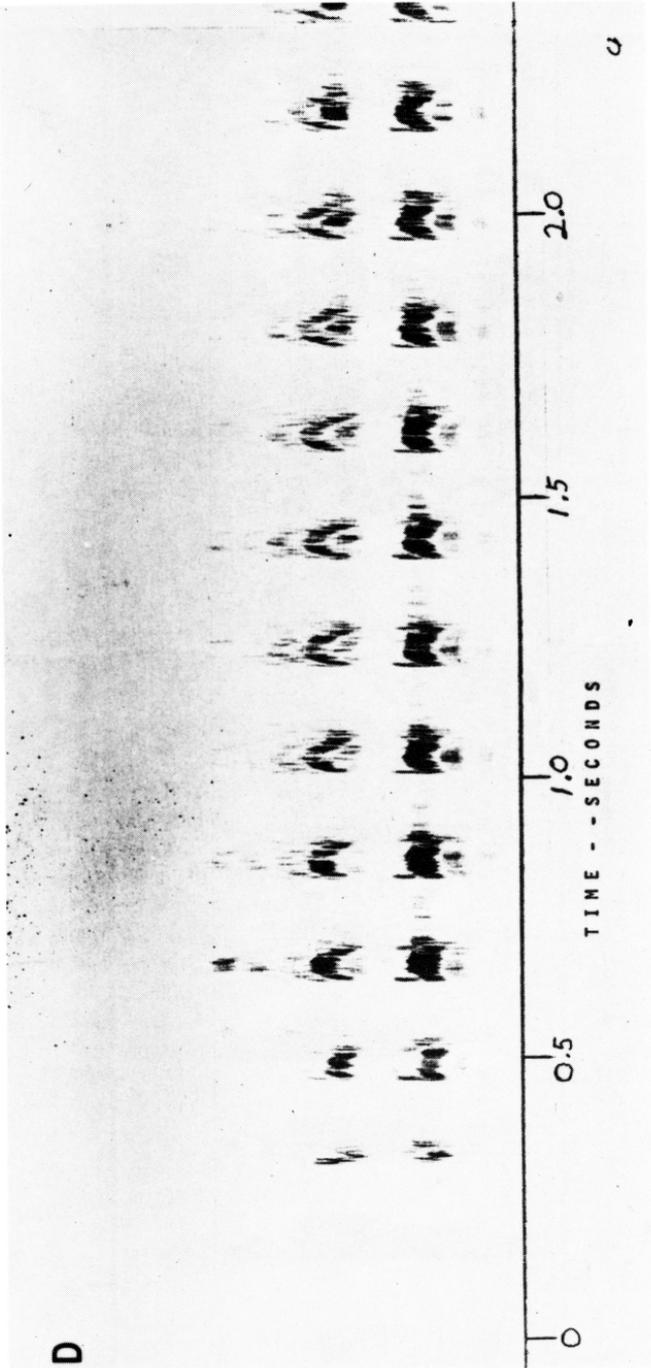
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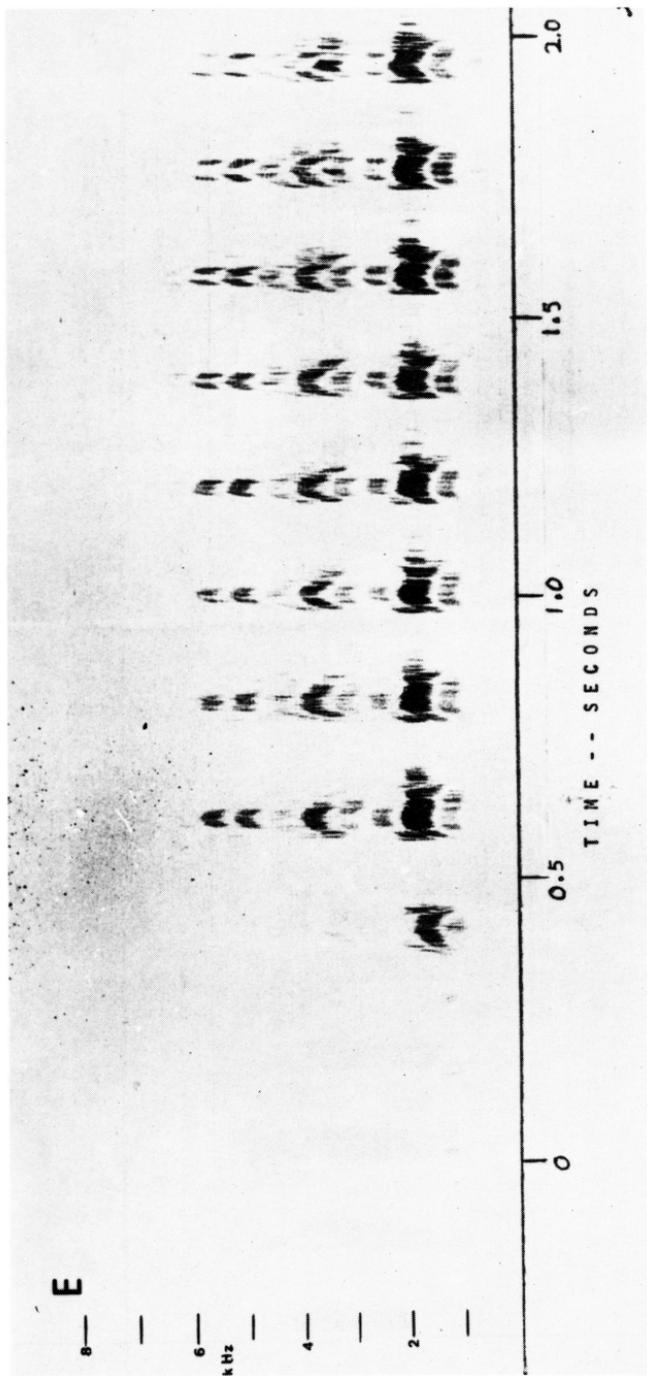
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Belton (? 1978) |
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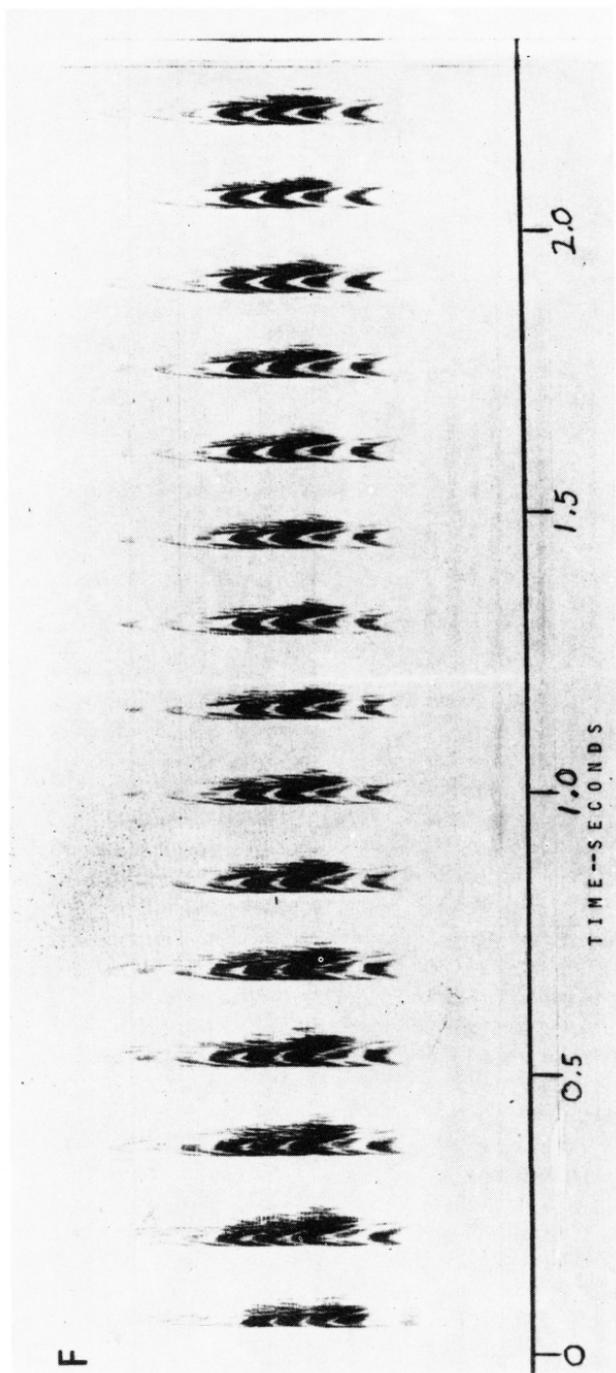












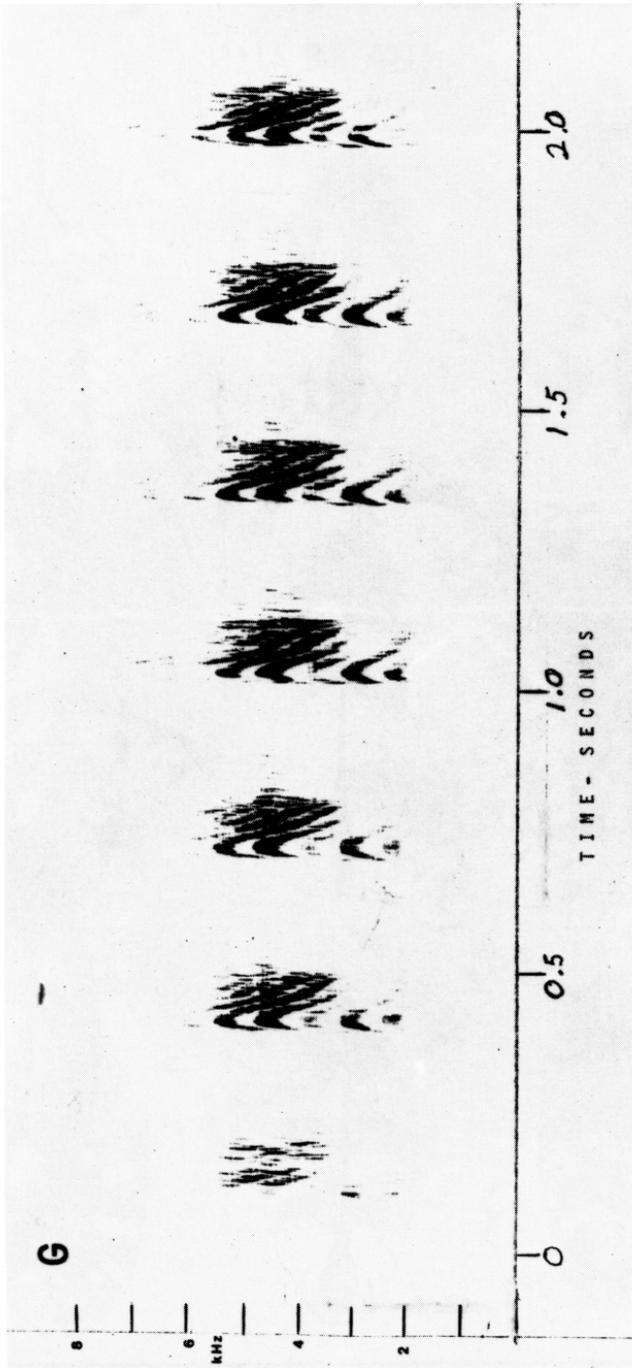
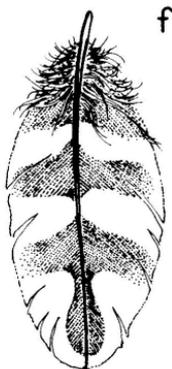
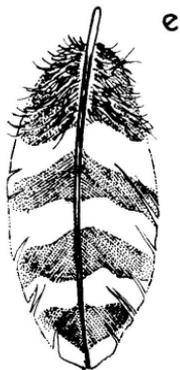


PLATE I



Handwritten signature



PLATE 2

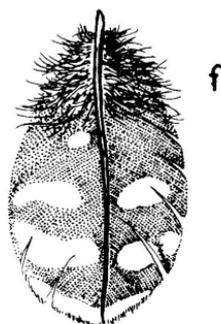
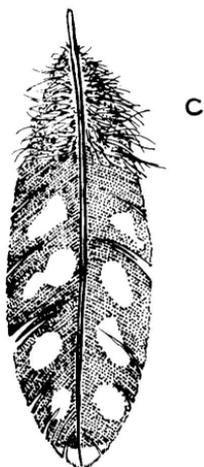
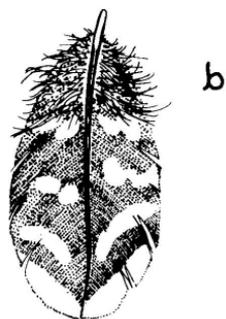


PLATE 3

