Notes on Common and Antillean Nighthawks of the Florida Keys

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The Antillean Nighthawk (Chordeiles gundlachii, here including the Bahama population vicinus) was recognized by Wetmore and Swales (1931) and Eisenmann (1962) as a distinct species from the Common Nighthawk (Chordeiles minor) based on its distinctive call notes and (by the latter author) based on the sympatry of the two forms on the Florida Keys. Monroe (1968) and the recent 34th supplement of the A.O.U. checklist (A.O.U. 1982) accepted this decision. Ridgway (1914) and Eisenmann (1962) noted that birds from the Bahamas were more buffy ventrally than were minor (subspecies chapmani of Florida and southern portions of adjacent states), and Oberholser (1914) presented measurements demonstrating that birds of the West Indies populations were smaller than mainland specimens. Bond (1956) and Monroe (1968) regarded vicinus as inseparable at the subspecific level from gundlachii.

We here describe the eggs and the natal and juvenal plumages of and the differences in enzyme proteins between the two species as further evidence supporting the specific status of *gundlachii*.

Available evidence suggests that no nighthawks summered on the Keys until 1941, when the Antillean bird was found there (Greene 1943). Nicholson (1950, 1957) twice described the first egg of gundlachii from the Keys. It was heavily incubated and paler in coloration than the eggs of C. minor chapmani that were collected 12 (or 13) June 1949 (date varied in two reports) on Stock Island. Nicholson, on the hand-written data form for an egg of "gundlachii," collected 12 June 1959 (DMNH 5958), but with dark spots and noted as being fresh, describes putting an egg of the Common Nighthawk (source not mentioned) in an Antillean Nighthawk nest in an attempt to get photographs of the female before the nesting pair was collected. Egg 5958 is apparently that of C. minor. The location of the gundlachii egg described by Nicholson is unknown. Several years later the most southerly Florida nesting for the Common Nighthawk was reported to be in Miami (A.O.U. 1957). Nicholson also verified the first nesting of the Common Nighthawk on the Keys by collecting a set of eggs on Stock Island, 27 May 1958 (WFVZ 43066).

Early summer records of the Common Nighthawk on the Florida Keys (Howell 1932, Nicholson 1950, Hundley and Hames 1961) do not necessarily indicate breeding. Common Nighthawks have been identified by voice in June at the Dry Tortugas, where no nighthawks nest (Robinson 1940, Stevenson 1966).

Both forms of nighthawks increased on the Keys during the 1960's and 1970's, probably due to deforestation. Alexander Sprunt, IV, identified both forms on Key Largo, June and July 1961, based on calls of males guarding nesting females (Eisenmann 1962). Donna Sprunt found both forms defending territories on Plantation Key and found two nests attributed to the Antillean form in June 1960 and July 1961 (Sprunt 1963), but a photograph of one nest showed two eggs with the large, darkly pigmented spots characteristic of minor (see below). Since 1957, occasional Antillean Nighthawks have been heard or collected on the Florida mainland north to Homestead, Miami, and Virginia Key, Dade County, and Flamingo, Monroe County (UMRC 2072; ENP 149) (Stevenson 1958, 1968; Ogden 1973). The two species may be unevenly distributed in the Keys now, as Stevenson found many Common Nighthawks on the upper Keys but none of the lower Keys during 1977-1980. During that period he found only two Antillean Nighthawks on the upper Keys but several on the middle and lower Keys. At Key Largo, where the 2 Antillean Nighthawks were collected, about 20-30 Common Nighthawks were seen and heard on each of the three trips, and a total of at least 20 nests of minor with eggs or small young was found.

To study the downy young, Stevenson collected an egg from each species of nighthawk flushed from nests on the Keys on 27 June 1977. The eggs were incubated at 38°C at the Archbold Biological Station, near Lake Placid (Highlands County), Florida. The Antillean and North American nighthawk chicks hatched on 30 June and 4 July, respectively. Chester and Marsha Winegarner weighed and photographed the chicks, recorded their voices before they were sacrificed at 36 h post-hatching, and prepared each as a museum study skin (C. m. chapmani, AMNH 823955; C. g. gundlachii, AMNH 823956, Fig. 2). Because both the eggs and the chicks differed in size and color pattern, we borrowed and compared additional eggs and downy young, and R. W. Dickerman borrowed and compared juvenal-plumaged specimens for us.

From May to July 1979 and 1980, 36 nighthawks,

³ Semicolons separate sections in different *issues*, commas separate sections in the same issue, and numbers of volumes are underscored. The *specific* section with the reference to the nighthawk record is 34: 74-80 (or *just* p. 79).



Fig. 1. Selected eggs of: Chordeiles gundlachii (left to right), Bahamas, USNM 40038, 36279; Florida, AMNH 17921, Puerto Rico, USNM 36280; Haiti, USNM 33615, 33616; C. minor chapmani, Florida, AMNH 16270, 16260, 17920, 9106, 9099; and C. acutipennis texensis (all AMNH, Tamaulipas, 9146; California, 9144; and Tamaulipas, 9110. The specimens of minor and gundlachii with wings extended in Fig. 2 were hatched from the 3rd egg from the left in each of those rows, respectively.

mostly adults, were collected and frozen for electrophoretic analysis. These included 16 Common Nighthawks and 20 Antillean Nighthawks. All Common Nighthawks were collected in Florida—12 from upper Key Largo (Basin Hills), Monroe County; 1 from 10.8 km southeast of Moore Haven, Glades County; 2 from near Clewiston, Hendry County; and 1 from near Stuart, Martin County. Of the 20 Antillean Nighthawks, 18 came from Nassau, New Providence Island, Bahamas, and 2 from upper Key Largo, Monroe County, Florida, where they are sympatric with the Common Nighthawk.

Electrophoretic studies were carried out by Karlin in laboratories at Tall Timbers Research Station. Organ homogenates from each individual were prepared by removing a sample of the skeletal muscle, liver, heart, intestine, and stomach. These tissue samples were homogenized together in an equal volume of 2% 2-phenoxy-ethanol and centrifuged at 25,000 rpm at 4°C for 60 min. The supernatant of watersoluble proteins was decanted and stored at 4°C overnight.

Methods of horizontal starch gel electrophoresis as

described by Selander et al. (1971) were modified (Guttman et al. 1980). All gels were 13.5% starch (Electrostarch, Lot #392, Otto Hiller, Madison, Wisconsin).

Eggs.—A total of 117 eggs (10 C. gundlachii, 97 C. minor chapmani, and 10 C. acutipennis) was obtained on loan. The eggs of chapmani were marked with larger and darker (sooty to blackish) spots than those of gundlachii (medium gray to brownish) (Fig. 1). Orlando Garrido also sent measurements of 25 eggs of gundlachii from Cuba. Wetmore and Swales (1931) noted that "only an occasional egg from North America [C. minor] is as finely marked" as those from Hispaniola. In contrast, eggs of C. gundlachii broadly overlap the eggs of C. acutipennis in their pale color and lighter markings (Fig. 1).

Bond (in litt. 21 Sept 1977) wrote that there is a set of two "heavily and distinctly spotted" eggs in the Philadelphia Academy of Sciences from St. Thomas, Virgin Islands. These are presumably eggs of gundlachii, although they are unusual in their heavy spotting and in there being two eggs in the clutch (see below).

There were no significant differences in size between the eggs of *C. m. chapmani* (n = 95, length 26.4– 32.4 mm, $\bar{x} = 29.1$, SD = 1.31; width 18.5–22.8, $\bar{x} =$ 21.1, SD = 0.75), and those of *C. gundlachii* (n = 35; length 25.5–33.3, $\bar{x} = 28.9$, SD = 1.68; width 20.0–23.3, $\bar{x} = 20.9$, SD = 0.66). Schönwetter (1964) also found no significant difference between the eggs of *chapmani* and those of *gundlachii* (including *vicinus*) in the weight and thickness of the shells.

Clutch size.—The Antillean Nighthawk in Florida regularly has a one-egg clutch, as compared with the two-egg clutches of the Common Nighthawk. We examined 11 sets of eggs of *gundlachii* from Florida, the Bahamas, Puerto Rico, Haiti, and Jamaica; only one from the Bahamas contained two eggs. Brudenell-Bruce (1975) found that 2 of 12 nests on New Providence, Bahamas contained two eggs. Bond (in litt. 21 Sept. 1977) wrote, however, that two-egg clutches were the rule in Cuba, and O. Garrido informs us (in litt. about 1980) that he found two eggs in 10 of 15 clutches in Cuba.

In contrast, 3 of 97 clutches of *minor* from Florida had one egg, and those may have been incomplete sets. One nest from Marco, Lee County, Florida, 28 June 1902 (FSM 1179), contained three eggs.

Natal plumage.—Recently hatched downy young of C. gundlachii are similar to those of C. minor but have finer, more dispersed, paler dark gray to sooty gray markings interspaced with creamy to grayish buff areas. They lack the heavy sooty brown to blackish blotches of minor (Fig. 2). Ventrally, downy young of minor have a narrow, dusky area in the interramal area, extending posteriad as a narrow line to join a dark stripe extending posteriad below the eye. This is obsolete in the gundlachii examined. Both species have pale chins and a patch on the neck with down



Fig. 2. Natal-plumaged specimens of: Chordeiles minor chapmani (left to right), Georgia, DMNH 43913, 43914, Florida, AMNH 823955; C. gundlachii, Key West, AMNH 823956; Bahamas, USNM 323451; Key West, DMNH 5031; and C. acutipennis (all USNM, Arizona 268830, Chihuahua, 165520, 165519.

plumes that are dusky basally and have pale buff to cream-colored tips. The breast and belly in both species are cream-colored to near white. We have not seen the downy young of the Cuban population. Natal-plumaged *C. acutipennis* differ from both forms in that they lack distinct dark markings and are cinnamon to ochraceous dorsally and on the neck and breast and cinnamon buff on the belly.

Juvenal plumage.—Two juvenile C. gundlachii from the Bahamas are similar to juvenile C. m. chapmani from Florida but are somewhat paler dorsally (Fig. 3); the edgings of the dorsal feathers of one are conspicuously more ochraceous than in chapmani. There is a greater contrast between the paler wing coverts and tertials of the Bahaman specimens than between those of the two Florida juveniles. Ventrally, the Bahaman specimens have narrower dark bars and are buffier than chapmani. The single juvenile from Cuba (the smallest gundlachii in Fig. 3) has extensive deep cinnamon edgings to the dorsal feathers and wing coverts and is more cinnamon to ochraceous buff ventrally.

The juvenal plumage of *C. acutipennis texensis* differs dramatically in being paler with fine vermiculations dorsally and in lacking the heavy black markings of both *gundlachii* and *minor*. Ventrally, juvenile *acutipennis* have weaker barring than either species, and they have a white, unbarred throat. They are buffy ventrally, as in gundlachii.

Voice.-Stevenson's impression of the recorded calls of the newly hatched young was that gundlachii gave a single, down-slurred "ee-yuh," while the call of the young minor seemed to be a shorter single note that was lower-pitched, more scratchy, and less downslurred. The calls were analyzed at the Florida State Museum by Erik Bitterbaum, using a Kay Electric Sonograph, Model 7029A, a wide band, and highshaped filters. Most of the 18 calls of gundlachii were composed of two dominant pulses of energy centered at about 2.5 and 6.0 kHz and were considered basically alike. Two calls were slightly different, and two were difficult to analyze. More variation was noted in the 36 calls of the minor hatchling. Only five of these resembled the calls of gundlachii, and only eight were considered similar to one another. Bitterbaum commented that minor may have a larger call repertoire.

The distinctive, somewhat nasal "beerb" or "beezhnt" (often written "peent") given by adult Common Nighthawks is strikingly different from the clicking, katydid-like "killikadick" of the Antillean bird, but many observers seem unaware of the fact that Common Nighthawks also give clicking sounds at times, and one observer noted the Antillean



Fig. 3. Juvenal-plumaged specimens (left to right) of: *Chordeiles minor chapmani*, Florida, ANSP 31904, DMNH 43914; C. gundlachii (all USNM), Bahamas, 323440, 323456, Cuba 172797; and C. acutipennis (both USNM, Arizona, 481179, 5028.

Nighthawk gives an occasional "beerb" note. The clicking calls of C. m. minor were rendered "dick-adick-a-dick-dick" by Gross (in Bent 1940). Stevenson and Richard Paul heard an adult C. m. chapmani on upper Key Largo, 2 July 1979, giving a call that resembled "quit, quit, quit." Occasionally, the call was given four times, and it was more liquid in quality and rendered more slowly than notes of the Antillean Nighthawk. It seems likely that notes such as these, if heard by observers not familiar with the vocalizations of vicinus, might be responsible for reports of that form well outside its known range. Stevenson heard both forms of nighthawks at Marathon (middle Keys) on the evening of 2 July 1979, noting that chapmani occasionally gave a double "beerb" note. Nicholson (field notes) also heard a double "beeah" on Stock Island, 27 May 1958. Also, he (1957) spoke of flushing a male "Cuban" Nighthawk that gave a single "beap" just before alighting that was "identical to the call that is commonly used by C. m. chapmani," but he did not mention whether or not it was previously identified as a "Cuban" bird by any other vocalization. (Note, also, the apparent confusion surrounding the eggs collected 12 June 1959 as described above.) In Nassau, birds gave a longer series of 5 to 7 syllables written as "killi-kadick-dickdick-dick," all syllables after the third being identical (T. Weed in litt., 28 January 1978).

The well-known "booming" sound is loud in North American birds, but in *gundlachii* it is "higher pitched, weaker, and less resonant . . . barely audible at fifty yards" (Wetmore and Swales 1931).

There is some evidence of interspecies territorial defense on the upper Keys, where observers have reported male chapmani driving away male gundlachii and, occasionally, a male gundlachii pursuing a male chapmani (A. Sprunt, IV in litt.). On upper Key Largo, Richard Paul and Stevenson watched a chapmani pursue a female-plumaged Antillean Nighthawk for, perhaps, 2-3 min. As has been pointed out by Bond (1963), defense of territory by one form of nighthawk against the other might tend to indicate that the two forms are conspecific and that the possibility of interbreeding exists. We know of no observations that would support or refute interbreeding. Bond (pers. comm.) related to Eisenmann that, although males of the Antillean form have a different vocalization from that of the continental population, it is not known whether or not females distinguish between them or whether or not eggs guarded by calling males of one sort were laid by females of that kind. In caprimulgids generally, Schwartz (1968: 225) considers "primary song" to be the most important factor in the determination of territory and mating.

It is possible that the "killikadick" vocalization of the gundlachii complex is derived from the clicking vocalization occasionally given by continental birds, but whether or not effective reproductive isolation has been achieved is not known. It would help to explain how occasional mixed pairs might form.

Electrophoretic analysis.—Although all 27 electrophoretically detectable, protein-producing cistrons were surveyed by Karlin as described in Guttman et al. (1981), several enzymatic proteins were not resolved. Additionally, the seven nonenzymatic proteins were monomorphic in all samples. Of the 10 resolvable enzymatic proteins, 5 (LDH-2, GOT-1, ME, MDH-1, and MDH-2) were also monomorphic in all samples. The electromorph (allele) frequencies for the five polymorphic cistrons (EST-2, PGI, PGM, IPO, and GOT-2) are given in Table 1.

EST-2 electromorph frequencies differ greatly in Common and Antillean nighthawks (Table 1). Specifically, the EST-2^ª and EST-2[®] electromorphs were in high frequencies in Common Nighthawks, whereas the EST-2^e electromorph was not observed in our Antillean Nighthawk samples. Likewise, the EST-2^c electromorph was found in high frequency in the Antillean Nighthawks, but it was not observed in Common Nighthawks. Five of the 16 Common Nighthawks were heterozygous for EST-2 a/d (1), b/c (1), and d/e (3) electromorphs, and 9 of 20 Antillean Nighthawks were heterozygous for EST-2 a/b (1), b/c (1), b/d (1), and c/d (6) electromorphs. Although this observation is consistent with genetic expectations, it may indicate occasional hybridization between the two forms. If occasional hybridization occurs, heterozygotes for EST-2 c/d and c/e electromorphs probably should have been observed in both samples. In view of the absence of these genotypes in both samples, it seems that hybridization, if it occurs, is limited.

In order that the electrophoretic data might be compared with other avian data, we calculated Nei's Standard Genetic Distance (Nei 1972) between pooled data from the two forms. The genetic distance value observed (D = 0.076 and I = 0.926) was on the order of genetic distance (and genetic identity) values observed among currently accepted species of parulid warblers (Avise et al. 1980). Thus, although no "marker loci" were found to differentiate the two forms of nighthawks clearly, the degree of differentiation observed, as documented by the variation of EST-2 between these two forms, is on the order of that observed by Avise et al. (1980) between other avian species. This factor, in concert with their sympatric occurrence in Florida, suggests that they are different species.

In conclusion, the Antillean Nighthawk, (C. gundlachii) differs from the Common Nighthawk (C. minor) in both the color and the number of the eggs, in the vocalizations of adults, in the color and, possibly, vocalizations of the newly hatched young, and, to a lesser extent, in the juvenal plumage. The geneticdistance value based on differences in the frequency of certain electromorphs is similar to values observed among species in other avian groups.

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TABLE 1. Electromorph frequencies for five polymorphic loci in Common and Antillean Nighthawks (Chordeiles minor and C. gundlachii).

	Locus electro- morph	Common Nighthawk	Antillean Nighthawk
EST-2	a	0.041	0.028
	Ь	0.041	0.250
	С	absent	0.555
	d	0.625	0.166
	е	0.292	absent
PGI	а	1.0	0.975
	b	absent	0.025
PGM	а	0.04	0.11
	b	0.96	0.89
IPO	а	1.0	0.975
	b	absent	0.025
GOT-2	а	0.04	absent
	b	0.96	1.0

erglades National Park (ENP); Field Museum of Natural History; Florida State Museum; Florida State University; Peabody Museum of Natural History, Yale; University of California Museum of Vertebrate Zoology; University of Michigan Museum of Zoology; University of Miami Research Collection (UMRC): United States National Museum of Natural History (USNM); and the Western Foundation of Vertebrate Zoology (WFVZ). O. Garrido kindly provided us with measurements of 25 eggs of gundlachii from Cuba. E. Bitterbaum and J. W. Hardy analyzed vocalizations of downy young. R. L. Crawford, D. Knowles, T. Maxwell, R. T. Paul, and M. Winegarner assisted in phases of this study. Virginia Vail translated a passage from Schönwetter, and George Barrowclough read the electrophoretic section. We are grateful to the American Museum of Natural History for the illustrations. R. W. Dickerman prepared the descriptions of the natal and juvenal plumages and assisted in editing the manuscript. The research was supported in part by a Henry L. Beadel Fellowship to Stevenson from the Tall Timbers Research Station and in part by National Science Foundation grant (BMS 7200102) to the MVZ.

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A New Subspecies of *Caprimulgus cubanensis* (Aves: Caprimulgidae) from the Isle of Pines, Cuba

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The Cuban Nightjar [*Caprimulgus cubanensis* (Lawrence)] is by no means a rare bird, either in Cuba or in the Isle of Pines (now called Isla de la Juventud), but like most caprimulgids it is nocturnal and difficult to see. It is usually detected at sunset and sunrise, when it incessantly repeats the syllables *gua-bairo gua-bai-ro* that give rise to its Cuban vernacular name. Because of its habits, few specimens exist either in Cuban or other museums.

The first report of the Cuban Nightjar from the Isle of Pines is that of Bangs and Zappey (1905: 203), who mention a specimen shot in the dense woods south of the Ciénaga de Lanier. Unfortunately, the bird was so mangled that it could not be saved. For many years the only specimen from the island was an adult male flushed from a nest, also near the Ciénaga de Lanier, and collected by James Bond (pers. comm.). Recently, however, my former colleagues Natividad Hernández and Mario Fernández obtained a specimen in a most peculiar way during a field trip to the island to study the rodent *Capromys*. At 2300 they stopped their vehicle to make some observations, after which they