

NOTES ON THE CAYENNE TERN IN URUGUAY

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The Cayenne Tern (*Thalasseus eurygnathus* = *Sterna eurygnatha* = *S. sandvicensis eurygnatha*) is widely distributed over more than 12,000 km, from southern Caribbean Islands (12°N), along the coast of Colombia and the coast and islands off Venezuela, through Surinam, Brazil, and Uruguay, and to Argentina as far as Puerto Deseado (Chubut *errore* = Prov. Santa Cruz, 48°S) (Hellmayr and Conover 1948:326-327; De Schauensee 1966:110). This bird is one of the least known of the terns and poorly represented in the collections of the world's principal museums. Little is known about the structure of this species, the characteristics of its local populations, its breeding habits, and its migratory movements.

Junge and Voous (1955) and Ansingh et al. (1960) report that the population of the Cayenne Tern which breeds in the Netherlands Antilles (12°N) displays an enormous amount of individual variation which is most apparent in the color of the soft parts of adults and young, and in the pattern of the eggs and downy chicks. While most of the variation is not explained, or is interpreted as being produced by an absence of, or only slight, selection pressure, the variation of the bill color is ascribed by Junge and Voous (1955:244) to the result of secondary intergradation between the northern black-billed *S. sandvicensis acuflavida* and the southern yellow-billed *S. eurygnatha* and the two forms are considered conspecific by these authors. Bill color ranges from uniform yellow to black with a narrow yellow tip, but the presence of some birds with uniform orange-red or red bills is not accounted for in the above interpretation. Junge and Voous (op. cit.) also exclude the possibility that black bills could be connected with seasonal and age changes.

Sick and Leão (1965) recorded a breeding colony of *S. s. eurygnatha* on Ilha dos Papagahios just off the Brazilian coast near Cabo Frio (23°S) on 12 July 1963; they reported also that, "All birds had light lemon bills, although occasionally a touch of black was present." Unfortunately they failed to obtain specimens or photographs to substantiate the record, or to study fresh soft parts in order to compare bill and wing characteristics with those re-

ported by Junge and Voous (1955:237-242) and Ansingh et al. (1960:53). Therefore, whether Antillean and Brazilian populations are similar or different seems still to be unsettled.

For the southernmost end of the Cayenne Tern's geographical range, Zapata (1965) reported that 19 pairs of *S. s. eurygnatha* were found nesting at Fitz-Roy (Santa Cruz Province, Argentina) on the coast at Punta de los Pájaros (46°55'S) in late December 1964 and early January 1965. These birds were amid a big colony of *S. hirundinacea*. Zapata could not obtain specimens but only a photograph and a description of egg color. As in the case of Sick and Leão (op. cit.), we have no comparative material to use as a basis for determining morphological differences between this population and those of northern Brazil and the Caribbean Sea. However, after studying a series of 10 skins in breeding and early postbreeding plumages, obtained at Rawson, Chubut Province, Argentina (43°S), on 10 December 1965, Voous (1968) concluded that they differ from southern Antillean birds by larger dimensions, particularly a longer bill, and probably represent a distinct population with a different breeding calendar. It can be added that Olrog (1967) recorded 50 *eurygnatha* at Cabo San Antonio, Buenos Aires Province, Argentina (36°30'S), in November 1962. Of four birds collected, two males displayed nuptial plumage ("plumaje estival").

Data obtained from Uruguay (35°S) might add to the knowledge of populations of this tern in this latitude of South America and offer some help in understanding the puzzling problem of breeding localities and their relation to geographical variability of this bird. The Uruguayan sample, a series of individuals of various ages and from various seasons, is one of the most complete collected for this species. The results obtained from analysis of this sample and comparisons with the others of South America and neighboring islands are presented in this paper. They suggest tentatively that: (1) most Uruguayan terns show close relationship with those of Argentina; (2) they differ from those of northern South America; and (3) they may breed on the coast of Uruguay or neighboring Argentina.

TABLE 1. Data on individual Cayenne Terns from Uruguay.

| Specimen number ^a | Collection date | Sex and age ^b | Dimensions (mm) ^c | | | | | | | Middle toe* | Weight (g) |
|------------------------------|-----------------|--------------------------|------------------------------|-------------|-------|--------|-------|--------|------|-------------|------------|
| | | | Wing chord | Wing length | Tail | Culmen | Gonys | Tarsus | | | |
| 391 | 5 March 1955 | ♂ Sub | 247(m) | — | 106 | 50.3 | — | 25.8 | 17.7 | — | |
| — | Aug. 1956 | ♀ Ad | 304 | 306 | 153 | 55.0 | — | 29.0 | 20.0 | — | |
| 764 | 18 Sept. 1960 | ♂ Ad | 306 | 310 | 160 | 54.3 | — | 27.9 | 19.7 | — | |
| 489 | 22 Feb. 1967 | ♂ Ad | 312+ | 316+ | 145+ | 59.5 | 37.5 | 28.0 | 18.6 | — | |
| 597 | 4 March 1961 | ♀ Juv | 295 | — | 115 | 45.6 | 24.0 | 27.6 | 17.4 | — | |
| 598 | 4 March 1961 | ♂ Ad | 290(x)+ | — | 129++ | 60.0 | 38.0 | 30.5 | 20.5 | — | |
| — | 4 March 1961 | ♀ Sub | 306 | — | 130 | 56.0 | — | 29.0 | 20.0 | — | |
| — | 4 March 1961 | ♀ Sub | 290 | — | 115 | 48.0 | — | 28.5 | 21.0 | — | |
| 611 | 14 Feb. 1963 | ♂ Sub | 282(m) | — | 110+ | 59.6 | 30.0 | 29.2 | 19.9 | — | |
| 620 | 25 Feb. 1964 | ♂ Juv | 296 | — | 110+ | 48.2 | 27.0 | 29.1 | 19.2 | — | |
| 621 | 25 Feb. 1964 | ♂ Ad | 310++ | 310++ | 115++ | 63.9 | 36.0 | 28.4 | 17.5 | — | |
| 622 | 25 Feb. 1964 | ♂ Sub | 308+ | — | 133+ | 58.9 | 36.0 | 28.5 | 19.8 | — | |
| 623 | 25 Feb. 1964 | ♀ Sub | 273(m) | — | 135 | 52.0 | 33.0 | 27.2 | 18.1 | — | |
| 636 | 11 March 1965 | ♂ Sub | 311 | — | 127 | 55.0 | 30.0 | 30.5 | 19.9 | — | |
| 647 | 5 Jan. 1968 | ♂ Sub | 281 | — | 121 | 51.1 | 33.0 | 25.1 | 17.1 | 170 | |
| 648 | 10 Jan. 1968 | ♀ Sub | 282 | — | 105+ | 53.0 | 30.4 | 29.2 | 19.2 | 260 | |
| 649 | 10 Jan. 1968 | ♂ Ad | 303+ | 309+ | 127+ | 58.0 | 27.8 | 27.8 | 18.0 | 300 | |
| 650 | 10 Jan. 1968 | ♂ Ad | 298+ | 308+ | 115+ | 62.0 | 39.0 | 29.0 | 19.0 | 280 | |
| 651 | 10 Jan. 1968 | ♂ Sub | 290(m) | — | 117+ | 55.2 | 35.4 | 28.9 | 20.6 | 280 | |
| 652 | 10 Jan. 1968 | ♂ Sub | 285(m) | — | 109 | 56.3 | 36.4 | 27.6 | 19.4 | 250 | |

^a Author's collecting numbers. Specimens 597 to 652 (14 skins) are in the author's collection; those dated 4 March 1961 without numbers are in the American Museum of Natural History; all the above specimens were collected by the author. Number 391 is in the collection of Facultad de Humanidades y Ciencias (Montevideo); 764 is in the collection of the Sociedad Taguató (Montevideo); 489 is in the Sociedad Guazú-birá (Montevideo). Specimens dated 4 March 1961 were collected at Playa José Ignacio (Dep. Maldonado); 611–652 at Playa Penino (Dep. San José); 764 at La Paloma (Dep. Rocha); 489 at Arroyo Solis (Dep. Maldonado); 391 at Isla de Lobos (Dep. Maldonado); the skin obtained in August 1956 was collected at Playa Pocitos (Dep. Montevideo).

^b Ad = adult; Juv = juvenile; Sub = subadult.

^c Abbreviations and notes on measurements: + = worn; ++ = greatly worn; (m) = first outermost primary growing, chord measurement was taken from the wrist to the tip of the 2nd outermost primary; (x) = apical end of the 1st outermost primary, in this case, is broken; * = measurement of the middle toe excludes claw.

URUGUAYAN OCCURRENCES

Specimens have been collected and observed in Uruguay from July to March. Details of individual measurements, dates, age, etc., are given in table 1.

SIGHT-RECORDS

Cayenne Terns were observed by the author in the following localities and dates: *January*. Dep. San José: Playa Penino (30 km W Montevideo), 28/1963, five birds; 5/1968, numbers of terns recorded and one collected; 10/1968, many birds were seen with different colored bills and body bulk, five were shot and preserved. *February*. Dep. San José: Playa Penino, 14/1963, 100 birds, one collected; 25/1963, three birds; 25/1964, 76 counted and four collected. *March*. Dep. Maldonado: Playa José Ignacio, 4/1961, 2,000 were seen and four obtained (Escalante 1962); 17/1963, 10 birds; 11/1965, 23 recorded, one collected; Laguna José Ignacio, 14/1967, three sitting on an islet. *July*. Dep. Maldonado: Playa José Ignacio, 7/1961, few birds (Escalante 1962). *August*. Dep. Canelones: Arroyo Carrasco, 1953, four birds in nuptial plumage (Escalante 1959). *December*. Dep. Maldonado: Laguna José Ignacio, 17/1967, four reddish-billed terns with black caps on a sandy bank.

FREQUENCY OF OCCURRENCE

According to the preceding paragraphs, the Cayenne Tern is a regular component of the avifauna of the Río de la Plata and Atlantic coast in Uruguay. The population density of this tern in Uruguay seems to vary in different years; furthermore it increases in early spring (September) and summer (January, February, March), and declines in mid-spring, fall, and early winter (October, November, April, May, June).

PLUMAGES AND MOLTS

It is important to consider the representative plumages and molts found in Uruguay and their distribution through the year. The following descriptions are taken from among the 20 skins of the specimens included in table 1.

NUPTIAL OR BREEDING PLUMAGE

This plumage is exemplified by two skins, a female obtained in August 1956 and a male (No. 764) collected in September (fig. 1, lower). Both specimens show wholly black pileum and fresh feathers.

POSTNUPTIAL OR POSTBREEDING MOLT

Two January males (649 and 650 of table 1, and fig. 1, middle) are in early stages of post-nuptial molt. In both, the forehead and crown

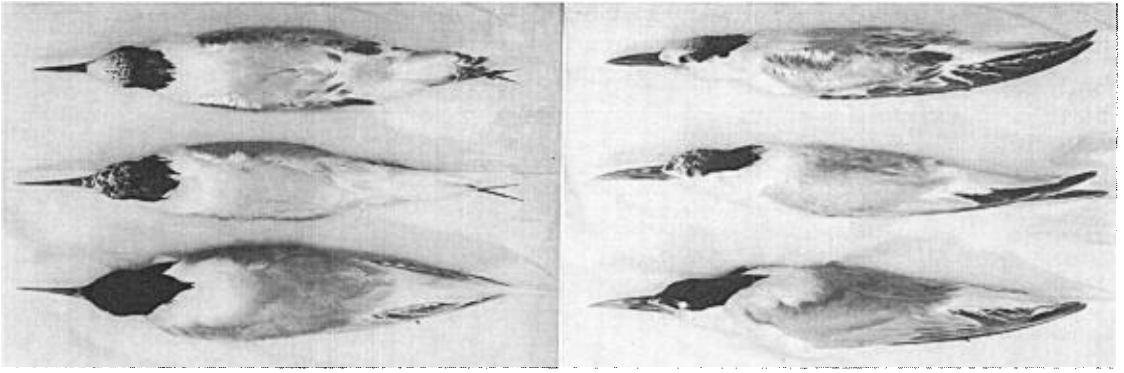


FIGURE 1. Dorsal (left) and side (right) views of three skins of Cayenne Terns collected in Uruguay. Lower: male in nuptial dress (September, skin No. 764); middle: a male in early stage of postnuptial or postbreeding molt (January, No. 650), and upper: a juvenile male in juvenal plumage (February, No. 620). See table 1 and the text for more details.

are white, heavily blotched with old black feathers; on the occiput some feathers have narrow white-edged ends; tails are worn but the central rectrices are new and growing; primary 8 (counting proximally from the outermost) is shed in No. 650, and 6 and 7 are obviously worn in both specimens. Males 598 and 621 (February and March) are in more advanced stages of progressing postnuptial molt with worn, shed, and new feathers among their primaries and rectrices.

SUBADULT OF IMMATURE PLUMAGE

Five males (Nos. 611, 622, 636, 651, and 652) and two females (Nos. 623 and 648), obtained from January to March, show white foreheads and crowns, these latter streaked with dark; nuchal feathers are brownish-black tipped with white; inner secondaries have dark centers. In skins 391, 623, 611, 651, and 652 the outermost primary is very short and growing, marking the same molting period. More details on worn wings and tails are given in table 1.

JUVENAL PLUMAGE

Two juveniles (Nos. 597 and 620 of table 1, and fig 1, upper) are in the first pennaceous (juvenal) plumage, with fresh feathers. In both, the heads are as in subadults; feathers of alula, primary coverts, secondaries, and scapulars have very dark centers; dark gray anterior lesser coverts form a dark band with touches of brownish near the anterior edge of the wing. All rectrices but the outermost have external webs of dirty grayish-brown, light towards the base but darkening subterminally and with broad white apical ends. The hatching of these birds can be deduced (by back-dating) as approximately in the months of October through December.

DARK PATTERN ON PRIMARIES

Nine adults and immatures in fresh or little-worn plumage show the following pattern in the inner web of the five outermost primaries: near the shaft a narrow, blackish band which grows broader in the last 3–5 cm of the tapering distal end; in the 2nd, 3rd, 4th, and 5th from the outermost, the broader portion of the band displays a well-pronounced hook along the margin of the web running back toward the base. The remaining specimens are not considered because many feathers are shed or very worn. Junge and Voous (1955:237, fig. 1, sketches c and d) describe a similar pattern, but in the 1–4 outermost primaries, in southern Caribbean and Brazilian birds; Ansingh et al. (1960) add that the pattern is variable for Antillean adult terns, occurring in 1–3, 1–4, or 1–5 outermost primaries.

CHARACTERISTICS OF SOFT PARTS

All the specimens I collected had brownish-black irides. Tarsi, toes, and webs were black but the soles of webs and toes were yellow. In some birds the underside of the heel was also yellow. Two adults in nuptial dress (August, September) and one from February had uniform yellow bills. A postnuptial male (March) and 10 subadults and juveniles among the 11 immatures collected showed considerable variation in bill color, ranging from yellow with black spots to a wholly black bill tipped with yellow. Black-spotted bills must occur in at least 40 per cent of immature birds ($n = 11$) in Uruguay, according to Romig's Table (Simpson et al. 1960:199). On the other hand, five birds with bills (fresh) ranging from apricot orange (S, 17/10° as defined by Villalobos-Dominguez and Villalobos 1947) to coral red (SSO, 12/9°)

TABLE 2. Comparative measurements of the different geographical populations of the Cayenne Tern.^a

| | Wing length (mm) | | | | | Exposed culmen (mm) | | | | | Weight (g) | |
|---|------------------|---------|----|------|------|---------------------|-----------|----|------|-----|------------------|--|
| | \bar{x} | Range | n | SD | V | \bar{x} | Range | n | SD | V | \bar{x} | Range |
| Northern South America (Antilles, Surinam, Venezuela) | 289.8 | 283-303 | 17 | 5.1 | 1.8 | 54.0 | 49-58 | 23 | 2.4 | 4.5 | 192 ^b | 182-206 ^b 176-226 ^c |
| Brazil | 295.7 | 283-319 | 17 | 7.7 | 2.6 | 54.5 | 47-61 | 19 | 4.2 | 7.7 | ? | ? |
| Uruguay | 309.8 | 306-316 | 6 | 3.37 | 1.09 | 58.9 | 54.3-63.9 | 7 | 3.50 | 5.9 | 274 | 250-300 |
| Southern Argentina | 314.1 | 304-321 | 10 | 6.6 | 2.1 | 58.7 | 53.5-62 | 10 | 2.8 | 4.8 | ? | ? |

^a All data for samples other than Uruguay are from Voous (1968) except as indicated.

^b Ansingh et al. (1960).

^c Haverschmidt (1968).

were recorded among 17 individuals collected and preserved.

GONADAL EXAMINATION

I had no opportunity to see the gonads of nuptial birds collected in Uruguay, but most of the specimens in postnuptial molt had gonads in a resting state. However, specimen 649, a male in early postnuptial molt (January), had active testes (left 10×5 mm, right 7×4 mm), and specimen 650 showed testes 2×2 mm.

COMPARISON AMONG AREAS

In order to draw some conclusions from the study of Uruguayan birds, a comparison of the data obtained from the sample of Uruguay

with the data of those assembled from other localities in the South American mainland and neighboring off-shore islands is presented in tables 2 and 3.

Table 2 presents the group measurements of the wings and bills of adult specimens of both sexes in Uruguayan birds, together with parallel data for samples of northern South America, Brazil, and Argentina from Voous (1968). A comparison (following Mayr et al. 1953:132-148, and Simpson et al. 1960:172-212) of the mean wing lengths of the four samples indicates a statistically significant difference ($P < 0.001$) between the Uruguayan and Brazilian samples ($t = 4.28$, 21 *df*), and between the Uruguayan and Antillean samples

TABLE 3. Comparisons among samples of different geographical populations of the Cayenne Tern.

| Character examined | Northern South America (Antilles, Surinam, Venezuela) | Brazil | Uruguay | Southern Argentina |
|---|---|---|-------------------------------|---|
| Nuptial plumage | March, April, June, July ^a | June, Aug., Sept. ^a | Aug., Sept., Dec. | Nov., Dec. ^{b,c} |
| Early postnuptial molt | July ^a | June ? ^a | Jan. | Dec. ^c |
| Postnuptial molt in progress (winter plumage) | Dec. (Venezuela), Feb. (Antilles), ^a Through the year (Surinam) ^d | June, July, Aug. ^a | Feb., March | March ^a |
| Subadults molting the outermost primaries | May-July ^a | June ^a | Jan., Feb., March | ? |
| Worn wings and tails | June ^a | June, July, Aug., Sept. ^a | Jan., Feb., March | ? |
| Primaries with dark pattern | 1-3, 1-4, 1-5 ^e | 1-4 ^a | 1-5 | ? |
| Juvenal plumage | Aug. ^a | Aug. ^a | Feb., March | ? |
| Active gonads | March, April, June ^a | ? | Jan. | ? |
| Egg-laying peak | June ^{a,e} | June, July ^f | ? | Dec., Jan. ^g |
| Black-spotted bill | High %, adults and immatures ^{a,h} | Low % in adults? ^{a,f} | High in immatures Adults ? | Present ? |
| Reddish bill | Occasional ^{a,e,h} | ? | Present | ? |
| Most frequent occurrence | March-Aug. (Antilles) Through the year (Surinam) ^{a,d} | April-Oct. ^a | Aug.-Oct.; Jan.-March | Nov., Dec., Jan., March ^{a,b,c,g} |

^a Junge and Voous (1955:234-244, fig. 2, Plaat IX).

^b Olrog (1967).

^c Voous (1968).

^d Haverschmidt (1968).

^e Ansingh et al. (1960).

^f Sick and Leão (1965).

^g Zapata (1965).

^h Voous (1963).

($t = 8.84$, 21 *df*). Similarly a comparison of mean exposed culmen length for the same samples yields significant t values of 2.466 (24 *df*, $P < 0.05$) for Uruguay vs. Brazil, and 4.26 (28 *df*, $P < 0.001$) for Uruguay vs. Antilles. The Uruguayan sample does not differ significantly from the Argentinian sample in either mean wing length ($t = 1.46$, 14 *df*, $P > 0.1$) or mean exposed culmen length ($t = 0.131$, 15 *df*, $P > 0.8$).

Six terns were weighed; five of these birds (4 ♂♂, 250–300 g; 1 ♀, 260 g) had orange or reddish bills, with a mean and range for both sexes of 274 and 250–300 g. The sixth specimen, a subadult male (No. 647) with the bill yellow and black spotted, weighed 170 g. This latter bird is not included in the range of variation mentioned above, for reasons explained in the following section.

DISCUSSION AND CONCLUSIONS

The results reported in the previous sections and the study of the comparative data of the several samples of the Cayenne Tern now available suggest the following tentative conclusions. Significant morphological differences exist between Uruguayan birds and those of northern South America (including southern Caribbean Islands) and possibly also those of northern Brazil (Rio de Janeiro and Bahia northwards). These differences are found principally in the measurements of the exposed culmen and in the length of wing, but also in the mean and range of weight, and perhaps in the variability in the distribution of the dark pattern of the outermost primaries. Some of these characteristics (exposed culmen and wing length) are very close to those reported for birds of southern Argentina by K. H. Voous (1968), who told me (in litt.), "I even believe that there is an Argentinian or perhaps a Uruguayan breeding stock."

Age and seasonal variations in plumages recorded in Uruguayan birds are distributed in months of the year opposite to those seen in northern South America and northern Brazil, and suggest a different breeding period adapted to climatic conditions at temperate latitudes of the Southern Hemisphere. Adult Uruguayan birds in nuptial dress have been recorded in spring (August, September, December) and juveniles were obtained in late summer (February, March). Also several stages of postnuptial and postjuvenile molts and worn feathers are present in Uruguayan birds through the months of January to March. All of these facts suggest that nesting activities in Uruguayan birds, as in Argentinian (Zapata 1965), occur through the months of September

to January, while in northern South America and northern Brazil similar behavior is seen between May and August (Ansingh et al. 1960; Sick and Leão 1965).

The Cayenne Tern is a regular component of the avifauna in Uruguay. Comparing the variation in the frequency of occurrence of this bird through the year in Uruguay with that in northern South America, northern Brazil, and southern Argentina, we can conclude tentatively that birds from Uruguay and Argentina probably winter regularly in Brazil and return again to southern latitudes in spring to breed. According to Voous (1968), "Of all geographical samples . . . Brazilian birds show the largest coefficient of variation. This may be ascribed to the heterogeneous composition of the Brazilian material (breeding birds and northern and possibly *southern migrants*)." The possibility of southern migrants suggested in this statement by Voous (the italics are mine) might account for the occurrence of a few birds with large bills in the Brazilian sample.

The preceding remarks and conclusions seem to minimize the possibility of the occurrence of northern breeders (southern Caribbean and northern Brazil) as transients or migrant visitors wintering in Uruguay and Argentina. This view is also supported by Haverschmidt's recent publication (1968:126) which reported that *eurygnatha* is common and present all through the year in Surinam, assembling in great numbers on the sand banks of the coast. Conversely, Argentinian birds must be regular transients in Uruguay.

Special treatment must be given to slender individuals reported among Uruguayan birds. These are represented by specimen 647 (table 1). Dr. Ernst Mayr, after reviewing my findings, advised: "I would suggest that you do not include this bird in your description of variation in Uruguayan specimens. . . . It would be unwise to treat this bird like other specimens until it is decided whether this is a visitor from some different region or an unusual juvenile stage."

The occurrence in Uruguay of some birds with reddish bills and heavy bodies is herein reported for the first time for all of the South American mainland. While red-billed specimens are occasional in the Caribbean Islands, we have no information about their measurements and weight, and comparisons are therefore impossible. Bills with extensive black areas are frequent among immature birds in Uruguay, but, because few of them have been collected, we cannot draw the same conclusions for adult birds.

Although these facts add information regarding the species structure of the Cayenne Tern, it is evident that more field work is needed throughout the geographical range of this form; thousands of kilometers remain unexplored for this tern along the mainland coast of South America and the off-shore islands (south of the Caribbean Sea) where no specimens have been collected from the few recorded nesting colonies.

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