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Cayenne Tern New to North America, with Comments on Its Relationship to Sandwich Tern

P. A. BUCKLEY AND FRANCINE GEBER BUCKLEY
U.S. National Park Service Cooperative Research Unit, Center for Coastal and Environmental Studies, Rutgers University, New Brunswick, New Jersey 08903 USA

On 30 May 1983, at Cape Hatteras Point, Cape Hatteras National Seashore, Buxton, North Carolina (that portion of the Outer Banks closest to Gulf Stream waters and where the Banks abruptly turn 90° to the southwest), we watched an adult Cayenne Tern (*Sterna sandvicensis eurygnatha*) engage in courtship behavior for 20 min with three Sandwich Terns (*S. sandvicensis* cf. *acuflavidus*). This is the first known occurrence of an individual of this taxon in North America, and it is some 2,100 km across open ocean from the nearest (and very recent) previous occurrence in the Virgin Islands.

This individual, identified as a male from its role in courtship activities and as at least 3 yr old from plumage characters, was identical to the accompanying Sandwich Terns except for bill color. All had varying degrees of white feathers in their crowns, a condition typifying incubating or brooding Sandwich and Royal (*S. maxima*) terns in that area (Buckley and Buckley 1972). It was immediately distinguished from members of the *sandvicensis* group (American Ornithologists' Union 1983: 229) by its all-yellow bill, in color somewhere between "lemon" and "banana" yellow. This feature, size, and the all-black forehead in alternative plumage distinguish *eurygnatha* from other crested terns, and, as we had previous familiarity with *eurygnatha* courting *sandvicensis*-like individuals in Puerto Rico (Buckley and Buckley 1970), we were able to identify this bird on sight. A suggestion of duskiness on both mandibular rami was apparent when the bird was viewed through a 30× spotting scope as close as 30 m, but, except for its bill color, it was not readily distinguishable from the accompanying Sandwich Terns in size, mantle color, vocalizations, or display postures. It performed Forward-erects, High-flights, and Pass-ceremonies [with accompanying vocalizations similar to those of both Sandwich and Royal terns (Buckley and Buckley in press)], in this manner behaving as a local breeder. Unfortunately, conditions did not permit our close examination of the two nearby (< 30 km) Royal and Sandwich colonies for its possible nest site. The Outer Banks of North Carolina harbor the largest aggregation of breeding Sandwich Terns away from the Gulf Coast, and in winter they disperse southwest to the Pacific Coast from Oaxaca to Ecuador, into the western Caribbean, and occasionally into the normal winter range of *eurygnatha* in the southern Caribbean. The North Carolina individual may have returned north with Sandwich Terns.

The Cayenne Tern is generally poorly known, although a review of its distribution, affinities, and taxonomic status is in preparation by Ruud van Halewijn. In the West Indies, *eurygnatha* was completely unknown or overlooked until the first sight report in 1962, and the first colony of *sandvicensis* was not found there until 1965. *Eurygnatha* was believed to breed somewhere in northern South America, and it was not until 1952 that its nest and eggs were described from Curaçao by Junge and Voous (1955). Shortly thereafter, Ansingh et al. (1960) reported additional colonies of crested terns in the Netherlands Antilles, all of which contained apparently freely interbreeding individuals ranging from phenotypically "pure" *sandvicensis* to "pure" *eurygnatha*, with great variation between those extremes. [A good recent summary is in Voous (1983).] Based on those findings, most workers now treat both forms as races of a single species, *sandvicensis*. Thirty years later we know of no other breeding population so variable, and recent fieldwork has uncovered more apparently "pure" *sandvicensis* colonies in the West Indies (Bond 1956 *et seq.*). It was thus quite a surprise when in June 1982 a Cayenne Tern was found paired with a Sandwich near St. Thomas, Virgin Islands and another unpaired Cayenne Tern was seen at nearby Anegada

Island where singles had been seen in previous years (Norton 1982). These were the only individuals of *eurygnatha* recorded in or near a *sandvicensis* breeding colony away from the southern Caribbean before the present report.

Following the discovery of the mixed colonies in the Netherlands Antilles, Sick and Leão (1965) and Escalante (1973) found *eurygnatha* breeding on the Brazilian coast, and then Escalante (1970, in press) and Daciuk (1976) reported, but did not name, austral-summer breeding populations of both Royal and Cayenne terns from the Argentinian Atlantic Coast. The taxonomic relationships between the *sandvicensis* and *eurygnatha* groups are unclear at the moment, as are their relationships to other crested terns (particularly to *elegens, bergii,* and *bengalensis,* among those traditionally considered valid species).

As to the interbreeding of *eurygnatha* and *sandvicensis* in the Netherlands Antilles, there is apparently no evidence for considering either that it is an especially recent contact or that the zone of hybridization is expanding, and there had been no indication of a possible exchange of alleles between the *eurygnatha* and *sandvicensis* groups until it was carefully looked for. In the early 1970's, while working in the same Cape Hatteras Royal Tern colonies nearest the site of the present observation, we obtained color slides and movies of incubating Sandwich Terns with yellow rami and, occasionally, faint yellowish blotches along the mandibles (unpubl. observ.). In 1983, Norton (pers. comm.) looked closely at breeding Sandwich Terns in the Virgin Islands, finding a "small fraction" with yellow patches on their bills. Voous (1968) reported on birds with blotched yellowish bills from Argentina, and, while these were not seen in breeding colonies, they were from the larger-billed, longer-winged austral-breeding population of *eurygnatha.* Similar accounts have come from Brazil (Sick and Leão 1965) and Uruguay (Escalante 1970).

These observations and those of *eurygnatha* in *sandvicensis* colonies in North Carolina and the West Indies raise several questions needing firm answers before we can say with surety what the taxonomic status of the two groups should be. (1) Is there any assortative mating or differential survival of individuals with different bill types in mixed colonies? (2) Is north- and southward introgression between *eurygnatha* and *sandvicensis* actually occurring, or (3) are only occasional individuals of *eurygnatha* wandering north of their normal range and sporadically hybridizing with *sandvicensis* and *vice versa*? Finally, (4) is introgression, in either case, a recent phenomenon? The first and fourth questions are easiest to answer: we have no information on these topics. As to northward introgression, there are at present only two known locations for such variants (Hatteras and the Virgin Islands), and in both places phenotypically "pure" *eurygnatha* have been seen courting or paired with *sandvicensis,* although to date very few individual *eurygnatha* appear to have been involved. Supporting an extra-limital hybridization explanation for these variant *sandvicensis* is Kepler and Kepler's (1977) observation in two Puerto Rico *sandvicensis* colonies that there were "no birds with mottled black and yellow, or almost entirely yellow bills, suggesting a lack of genetic contact with the more southerly *S. s. eurygnatha.*" It is doubtful that they looked for such subtleties as yellow rami. On the other hand, support for southward introgression comes from the presence of austral-breeding-sized individuals, with bill color tending towards *sandvicensis,* as far south as central Brazil (Sick and Leão 1965), and even to Uruguay and Argentina (Voous 1968, Escalante 1970), although data on changes in the frequency of dark-billed birds southward in South American populations do not exist. In sum, most evidence seems to favor reciprocal introgression of *eurygnatha* and *sandvicensis* alleles as the explanation for anomalous bill colors in both populations and presently supports the treatment of these two taxa as conspecific.

As new colonies of Sandwich Terns are discovered in the West Indies, it will pay observers to look very carefully for signs of *eurygnatha* introgression and to quantify it if found. Likewise, it should be sought in U.S. Atlantic and especially Gulf Coast Sandwich Tern colonies. Allozyme analyses of the *sandvicensis* and *eurygnatha* groups, particularly in the southern Caribbean hybrid zone, should shed important light on their systematic and genetic interactions. Information on the South American populations of *eurygnatha* (especially concerning bill coloration) also would be helpful. We offer one caution, in passing, to all workers: a small percentage of Cayenne Terns in the southern Caribbean and in Argentina (elsewhere?) have clear orange (or even "red") bills remarkably similar in color and shape to *elegans*—yet another facet of a complex taxonomic problem. In closing, we advise against the temptation to refer to bill color "polymorphism" in Sandwich/Cayenne Terns: no matter what *is* happening, it is clear that the variation is continuous and so *not* an example of polymorphism.

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Observer Visitation Frequency and Success of Mourning Dove Nests: a Field Experiment

JAMES D. NICHOLS, H. FRANKLIN PERCIVAL, RICHARD A. COON, MICHAEL J. CONROY, GARY L. HENSLER, AND JAMES E. HINES
U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20811 USA

Field studies of nesting success generally require visits by the investigator to the nests under study. Such visits may themselves influence nesting success, however, and this possibility has been discussed and investigated by a number of workers with a variety of bird species. Livezey (1980) reviewed the relevant literature for duck nests and noted that most studies failed to demonstrate differences in nesting success between visited nests and those not visited. Livezey (1980) found in his own work that nest abandonment may have occurred as a result of disturbance by observers but that nest predation was not related to time spent by observers at nests or number of observers approaching nests. Various components of nesting and breeding success in seabirds are thought to be adversely affected by human disturbance and nest visitation (Gillett et al. 1975, Robert and Ralph 1975, Ollason and Dunnet 1980). Upland, ground-nesting species have also been studied (e.g. Stoddard 1931, Evans and Wolfe 1967, Henry 1969, Roseberry and Klimstra 1970, Klimstra and Roseberry 1975), and, although conclusions have varied, a number of these workers found no effect of observers on nest-predation rates.

The effects of human visitation on nest success in tree- and hole-nesting species have received some study. Willis (1973) found no difference between survival rates of visited and unvisited Bicolored Antbird (*Gymnopithys bicolor*) nests that were monitored by observation of adult behavior patterns away from the nests. Anderson and Storer (1976) found no relationship between nest-visitation frequency and nest success in Kirtland's Warbler (*Dendroica kirtlandii*). Using a convincing field-experiment approach, Gottfried and Thompson (1978) and Gottfried (1978) found no difference in predation rates on experimental nests (abandoned nests of American Robins, *Turdus migratorius*, Northern Cardinals, *Cardinalis cardinalis*, and Field Sparrows, *Spizella pusilla*, were used) that were visited daily and those that were not visited at all. Using data from Cornell's North American Nest Record Card Program, Bart (1977) concluded that daily mortality rates of nests of American Robins, Eastern Bluebirds (*Sialia sialis*), and Mourning Doves (*Zenaida macroura*) were higher the first day after a nest visit than on subsequent days during the nestling period. Bart and Robson (1982), however, later pointed out that these results could also be explained by an hy-