

of Natural Resources of Ontario and the staff of Kap-Kig-Iwan Park is appreciated.—JAKE C. RICE, Dept. Biology, Memorial Univ. of Newfoundland, St. John's, Newfoundland A1B 28 Canada AND Dept. Zoology, Arizona State Univ., Tempe, Arizona 85281. (Present address: Center for Environmental Studies, Arizona State Univ., Tempe, Arizona 85281.) Accepted 20 June 1980.

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Courtship feeding and copulation of Royal Terns.—Although mentioned by Buckley and Buckley (Ibis 114:344–359, 1972) in their paper on the nesting of Royal Terns (*Sterna maxima*), courtship feeding and copulation have not been described for this species. These performances may occur on beaches away from islands used for nesting (Kale et al., Bird-Banding 36:21–27, 1965). Such breeding activities were apparently performed off site by the terns I studied on Cabretta and Sapelo, tree-covered islands in Georgia where they have never been known to nest. Royal Terns have, however, nested on Little Egg Island 3–10 km away (Kale et al. 1965).

My studies were made from 18–28 April 1979. It was difficult to quantify all phases of behavior since the terns were crowded in groups of from 20–200 or more, resting and preening at the water's edge.

Males, carrying a fish crosswise in their bills and making *kur-itt, kur-itt* notes, initiated courtship feedings by flying low over the flock, apparently to locate and alert their mates, possibly by individually recognizable "fish calls" described by Hutchinson et al. (Behavior 32:150–157, 1968) for the Sandwich Tern (*S. sandvicensis*). Transfers of fish took place in 3 situations. (1) Transfers occurring within the crowd of other terns were noted 8 times, but were interfered with twice by other terns and twice by Laughing Gulls (*Larus atricilla*) that rested among them. In the other 21 feedings or attempted feedings, the birds which were considered female (because they received food) either (2) walked out from the crowd or (3) flew to an empty part of the beach 5–10 m away.

Both birds displayed, with necks extended upward and the fore part of the closed wings held outward (Fig. 1). The female stood lower than the male, snatching the fish so quickly that display was often only momentary. The size of the fish offered appeared to be important to female selection. On 23 occasions in which the female accepted, the fish was about 7 cm in length. Of 7 refusals observed, 4 times in succession by 1 female, the fish was 5 cm in length or less and slender. When 1 male offered his mate a small fish and was refused, he walked over to offer the fish to a neighboring tern. This tern, sex undetermined, also refused. The male then returned and after several tries mounted his mate, swallowing the fish as he did so. Full copulation followed. This was the only time I observed any relation between courtship feeding and copulation.

Sometimes males and females flew to dip their bills in the waves 2–4 times. Afterwards, males flew to sea and females returned to the flock. One pair fed, then walked together in full display to the water's edge and dipped their bills in a mixture of wet sand and water 6–8 times.

Copulatory or pre-copulatory behavior, with one or more pairs performing, was so common as to be almost continuously occurring in larger flocks. Displays preceded copulations. The male, with neck extended and slightly back, and the bends of wings out like a skirt (Fig. 1), tried to walk around the female who kept turning. She often started in a low resting pose, assuming the display only as the time of mounting approached. The male held his head higher than hers, pointing his bill downward. Copulations lasted 50 sec–4 min. During nearly all of this time, males merely stood on the shoulders of the females, flapping their wings to

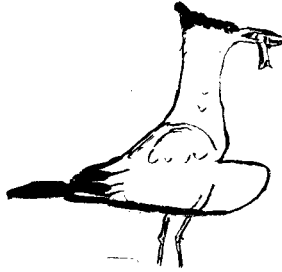


FIG. 1. Male Royal Tern in pose for courtship feeding.

maintain balance. The body of the female sank slightly, as her bill pointed upward. Periodically (2–3 times in longer copulations) the male worked himself near the rear of the female, coming to rest on his tarsi. He fell slightly to the right, beat his wings and maneuvered his tail under the elevated tail of the female. Cloacal contacts lasted only a few seconds. Many copulations ended with the female walking ahead, thus dumping the male. Three males and 1 female displayed briefly following copulations.

A third form of behavior was the courtship flight, similar to the “Gleitflug” described by Dirksen (J. Ornith. 80:427–521, 1932) for the Sandwich Tern. Seen only once, a pair of Royal Terns flew close together, circled high over beach and dunes and then flew out to sea where one of them floated down on the other 3 times with its wings held in a “V.” Aerial displays of other terns are described by Cullen (Ardea 48:1–39, 1960).

In discussion of these observations, Buckley and Buckley (1972) distinguished drinking-skimming and feeding-skimming. Dipping of bills in the waves following courtship feedings was observed; however, this behavior appeared to be a washing of the bill to get rid of mucous left from the fish. There were, curiously, 2 points of resemblance between Royal Terns and the Swallow-Tailed Kites (*Elanoides forficatus*) whose pre-nesting behavior I watched in a preceding month (Kilham, Raptor Res. 14:29–31, 1980). Both species have unusually long copulations, the kites up to 40 sec. This may be related to both species having long wings and bodies plus relatively short legs. In both species, the male stands on the back of the female prior to holding on while sliding his forked tail under hers. Another similarity relates to courtship feeding. The females of both species demanded an offering of a definite type. With the terns this was a fish about 7 cm long and with the kites an anole (*Anolis carolinensis*) of slightly smaller size. Females of both species refused, sometimes repeatedly, other offerings. The refusals of female terns are interesting in relation to the speculations of Nesbit (Nature 241:141–142, 1973) that 1 function of courtship feeding may be to give females a chance to assess potential mates as future providers for chicks.—LAWRENCE KILHAM, Dept. Microbiology, Dartmouth Medical School, Hanover, New Hampshire 03755. Accepted 10 June 1980.

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Two cases of commensal feeding between passerines.—Observations of birds exploiting the feeding behavior of other organisms are not uncommon. Birds may use other types of animals, such as monkeys (*Macaca* sp.) (Stott, Auk 64:130, 1947) and army ants