Inst. Ornithol. 3: 280) showed asymmetrical blood vessels in *F. magnificens* but did not comment about them.

Other representative pelecaniforms obtained as fresh and/or preserved specimens showed this unusual circulatory arrangement to have no ordinal significance. In all of the following species, the efferent venous pattern was symmetrical: *Phaethon aethereus, P. lepturus, P. rubricauda, Pelecanus erythrorhynchos, P. occidentalis, Sula dactylatra, S. leucogaster, S. sula, Morus bassanus, Phalacrocorax auritus, P. olivaceus, P. magellanicus,* and *Anhinga anhinga.* Hence the efferent venous plan of frigatebird kidneys appears to be curiously atypical. Although possibly lacking functional significance in the adult kidney, the arrangement implies a distinctive pattern of morphogenesis.

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Habituation of aggressive responses to avian predators by terns.[1]—Recently, Rydén (1970) examined the antipredator behavior seven or eight pairs of Common Terns (*Sterna hirundo*) directed towards a pair of Herring Gulls (*Larus argentatus*) at a breeding colony in northeast Sweden to determine whether the waning of predator-response observed under experimental situations in some bird species (see Rydén 1970 for references) also occurs in natural situations. Although he found no decrease in attack intensity by the terns, he suggested that habituation may have occurred, but was masked by other factors. While studying Arctic Terns (*S. paradisaea*) at Churchill, Manitoba in 1967 (Evans and McNicholl 1972) and Forster's Terns (*S. forsteri*) at Delta, Manitoba in 1968 and 1969 (McNicholl 1971), I had an opportunity to watch similar antipredator behavior in terns. These observations, combined with those in the literature, suggest that the location at which the predator breeds in relation to the breeding colony may affect the terns' defensive responses.

In 10 Arctic Tern colonies of 141 nests studied at Churchill, avian predators nested out of sight of the colony, except at colony D on whose periphery two pairs of Herring Gulls nested. In all colonies except D, Arctic Terns attacked Herring Gulls and Parasitic Jaegers (*Stercorarius parasiticus*) whenever they started to cross the pond or land encompassing the colonies. At colony D Herring Gulls were not molested as they approached their nests. At Delta most potential avian predators of the Forster's Terns, including Herring and Ring-billed Gulls (*L. delawarensis*) and raptors nested far from the colony, but two pairs of Black-crowned Night Herons (*Nycticorax nycticorax*) nested within the boundaries of the colony in 1968. Forster's Terns attacked all Herring and Ring-billed Gulls, all raptors, and all other herons as soon as they approached the colony, but did not attack Black-crowned Night Herons until they began the descent for a landing, at which the terns attacked vigorously until the herons landed.

Similarly Kruuk (1964: 13–18) found that Black-headed Gulls (*L. ridibundus*)

[1] Publication No. 19 of the University of Manitoba Field Station, Delta, Manitoba.

attacked avian predators that nested away from the colony more readily than those that nested on the periphery, and that the latter were usually attacked only when about to land within the colony or exhibited apparent predatory behavior. In Finland, R. Lemmetyinen (pers. comm.) noted that Arctic and Common Terns nesting on islets with gulls were more tolerant towards gulls than those nesting on islets without gulls.

These observations suggest that habituation occurs to predators nesting on the edge of the colony, and, as proposed by Rydén (1970), to predators nesting within the colony. The latter is suggested by a lack of attacks on the predator while it is at its own nest, even though they are attacked on approaching the nest (Rydén 1970, McNicholl 1971: 379, Lemmetyinen, pers. comm.). Little, if any, habituation occurs if the predator does not nest near the colony.

Aggression directed at potential predators would seem to be advantageous if it fended them off as they approached the colony. If the potential predator nested in the vicinity of the colony, selective pressures for attacking the predator could be somewhat relaxed; many predator species tend to feed away from the immediate vicinity of the nest (e.g. van Rossem 1933) and, in some species at least, only a few "specialists" appear to be involved in actual predation (Kruuk 1964: 11). Both the Herring Gulls at colony D at Churchill and the night herons at Delta invariably fed away from the colony, and neither were ever seen in predation attempts.

Such habituation may also have strong advantages. Continual disturbance by predators has been known to cause prolonged parental neglect or night desertion (Marshall 1942, Emlen et al. 1966), and even if actual desertion or prolonged neglect does not take place, the predator's presence may cause decreased incubation (Crowell and Crowell 1946, Austin 1951, Hatch 1970). Thus some habituation to avian predators may be necessary to ensure adequate incubation, brooding, and protection of eggs and young. A balance between aggression and habituation towards potential predators, depending on the local situation, would appear to ensure minimum nest loss. Other factors, such as the effectiveness of the particular predator species in a particular area (see Lemmetyinen 1972), would of course modify this balance.

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An attempted third brood in the White-throated Sparrow.—The White-throated Sparrow, *Zonotrichia albicollis*, is usually considered to be single-brooded. Lowther and Falls (1969, U. S. Natl. Mus. Bull. 237: 1373) suggested that the White-throat might on occasion attempt a second brood, and mention a personal communication with Lawrence regarding a known second brood near Rutherglen, Ontario. While conducting behavioral studies of the White-throated Sparrow at the Wildlife Research Station in Algonquin Park, Ontario, in 1971 and 1972, we found 24 pairs of White-throats that were definitely double-brooded. This phenomenon may have been related to the abundant food supply in our study area provided by a high population of the spruce budworm (*Choristoneura fumiferana*) in both years.

Of particular interest, one pair of White-throated Sparrows attempted to rear a third brood in 1972. The female, which was banded with a unique color code early in May, was discovered incubating four eggs on 29 May. All the eggs hatched on 6 June, the young were banded on 11 June and left the nest on 14 June. They were seen with the parents near the end of June, and one was recaptured on 23 July at a feeding area one-fourth mile from the breeding territory. On 27 July the male and female were discovered in their territory feeding at least three unbanded young about 2 weeks off the nest. However, the banded female did not remain with this second brood at all times, and on the same day she was flushed from a nearby nest that contained three eggs. The male, easily recognized by a unique song pattern, usually stayed in the vicinity of this nest with the second brood. This third brood hatched on 31 July, but none of the young survived past 3 August. We have found this poor survival normal for August broods in Algonquin, and perhaps related to decreases in both food supply and parental attention. Egg-laying for first nests in Algonquin Park usually starts about 22–23 May; thus this pair had successfully reared two broods and hatched a third in a span of 70 days. To our knowledge, this is the only case on record of a pair of White-throated Sparrows attempting to raise a third brood. The White-throated Sparrow research program in Algonquin Park is supported by the National Research Council of Canada.—DANIEL J. LONCKE and J. BRUCE FALLS, *Department of Zoology, University of Toronto, Toronto 181, Ontario, Canada.* Accepted 29 Dec. 72.