ANTIPREDATOR BEHAVIOUR IN NESTING ZENAIDA DOVES (ZENAIDA AURITA): PARENTAL INVESTMENT OR OFFSPRING VULNERABILITY

by

JOANNA BURGER1), MICHAEL GOCHFELD2), JORGE E. SALIVA1), DEBORAH GOCHFELD3), DAVID GOCHFELD4) and HENRY MORALES5)

(1) Department of Biological Sciences, Rutgers University, Piscataway, New Jersey 08855. 2) Environmental and Community Medicine, UMDNJ-Robert Wood Johnson Medical School, Piscataway, New Jersey 08854. 3) Department of Zoology, University of Hawaii at Manoa, Honolulu, Hawaii 96822. 4) Oberlin College, Oberlin, Ohio 44074. 5) Culebra National Wildlife Refuge, Culebra, Puerto Rico, U.S.A. 00645)

(With 3 Figures)
(Acc. 17-IV-1989)

Introduction

For most organisms successful survival and reproduction depends on predator avoidance. Nesting birds avoid predation by relying on cryptic coloration, nesting in inaccessible locations (Lack, 1968), possessing antipredator behaviours to defend themselves or their chicks (Tinbergen, 1953; Kruuk, 1964), relying on the antipredator behaviour of other individuals or species (Nuechterlein, 1981; Burger, 1984), or a combination of the above. The nest dispersion pattern of birds is often a compromise between nesting far apart for crypsis, and nesting in dense groups that can contribute predator defense and increased vigilance for the colony (Tinbergen et al., 1967). Species that normally nest solitarily, such as shorebirds, often nest in colonies of other species to gain the advantage of their vigilance and antipredator behaviour (Koskimies, 1957; Ericksson & Gotmark, 1982). Such species may also exhibit antipredator behaviours, such as distraction displays to decoy predators away from the nest (Nice, 1923; Gochfeld, 1984).

Antipredator behaviour involves risk to the parent, as well as increased time and energy costs. Presumably offspring survival can be enhanced by the antipredator behaviour of the parents, and such care must be a compromise between the benefit to the present brood, and survival of the parent for future broods (Trivers, 1972). Two hypotheses have been proposed to account for defense behaviour. Trivers’ (1972) cumulative parental investment hypothesis predicts that nest defense should increase
throughout the breeding cycle because the cost of the offspring (or the total parental investment) is increasing. Alternatively, Skutch (1949) and Andersson et al. (1980) have proposed that the level of nest defense should correspond to the vulnerability of the offspring.

In this study we test these alternative hypotheses by examining the antipredator behaviour of zenaïda doves (Zenaida aurita) nesting on seven islands in the Culebra archipelago, Puerto Rico. We determined how antipredator behaviour varies as a function of stage in the reproductive cycle, whether the behaviour of doves nesting within seabird colonies differed from those nesting outside colonies, and whether their nest departure and antipredator behaviour differed as a function of habitat. Changes in antipredator behaviour indicating changing parental investment occur during the nesting cycle in colonial species that mob predators (Erwin, 1979), and may also occur in solitary-nesting species. Moreover, differences in the behaviour of otherwise solitary nesting species that nest within and outside colonies of other species have not been examined.

On the islands around Culebra, zenaïda doves nest in a variety of habitats from cliffs and rocky outcroppings to under dense herbaceous vegetation and low shrubs (Burger et al., 1989). They nested in all available habitat types on the two islands studied, although they nested closer to terns (Sterna spp.) than expected. On mainland Puerto Rico zenaïda doves nest in forest edge, mangrove forests, dry scrub and mixed agriculture and urban areas (J. W. Wiley, pers. comm). They nest primarily in trees in Puerto Rico, contrary to their nest site choices on Culebra. Nellis et al. (1984) reported that on St. Croix, St. Thomas, and the U.S. Virgin Islands zenaïda doves nested in grass, bushes, ledges, ground, trees, and rocks, but they did not provide relative use estimates. Most studies characterize the nesting habitat as bushes and trees (Gosse, 1847; Biaggi, 1970; Raffaele, 1983). Elsewhere (Burger et al., 1989) we describe their preference for nesting in seabird colonies, a feature not remarked on by other authors.

Study area and methods
We surveyed ten islands or cayos for nesting zenaïda doves: Raton, Agua, Geniqui, West Lobito, Matojo, Molinos, Yerba, Lobo, Botella and Sombrerito. The latter three islands contained no breeding doves and no breeding seabirds. Thus we will discuss only the former seven.

Raton (1.8 ha) is dome shaped with 20 m high cliffs and steep vegetated slopes (mostly Conocarpus erectus, Cyperus planifolius). Agua (3.7 ha) has low cliffs with a flat top with low, dense, mixed-species vegetation. Geniqui (West, 4.4 ha) has sheer cliffs on all sides with a dense stand of Cyperus planifolius. Lobito (6.1 ha) has low cliffs and is dome-shaped,