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Modified Milk Carton Nest Box for Studies of Prothonotary Warblers.—Some field studies of avian reproductive success require large numbers of nests. Nest boxes are useful for increasing densities of cavity nesters limited by nest site availability and for facilitating the location of nests.

In 1984, we undertook an investigation that required a large number of Prothonotary Warbler (*Protonotaria citrea*) nests. Expense, weight, and construction time were key factors that led to our use of a nest box assembled from milk cartons. We modified the milk carton nest box originally described by Davis (Eastern Bird Banding Assoc. News 31:271, 1968) and Woodward (Maryland Birdlife 21:151-152, 1973) to improve its durability for use in a riverine environment.

Each nest box was constructed of parts from 2 sealed, empty, 1.9 l (½ gal) plastic-coated cardboard milk cartons cut as shown in Figure 1a-b. Part B was forced into E by bowing the sides of B (Fig. 1c). This provided added strength and trapped a layer of air between B and E which may help to insulate. A hole of appropriate size (we used about 3.8 cm) was made with a sharp, pointed scalpel through both layers on one side, centered about 6 cm from the top of Part E. Standardized holes can be cut using a hole saw bit on an electric drill. Part C was taped (strapping tape) to A to form an overhanging roof (Fig. 1d). Vents (about 5 mm in diameter) were cut in the sides of the roof-cap (Part A + C) and drainage holes were cut in the floor. Then the roof-cap was forced over the top of Part E; a fastener was not needed. A climbing trellis for the young was not necessary because Prothonotary Warblers completely fill their nest cavity to the bottom of the entrance hole.

We obtained the empty, sealed, plastic-coated cardboard milk cartons from a dairy at a cost of 10 cents each in lots of 500. Assembly time was less than 5 min per box. Carton boxes weigh about 1% of the weight of wooden nest boxes of similar size and thus are easier to carry and place. They also are disposable and largely biodegradable.

We attached these boxes to trees by wrapping 2.54 cm wide (1 inch) strapping tape around both the box and the tree (Fig. 1e). The tape and the exterior of the box were then lightly spray-painted a flat gray or brown. A nontoxic paint is preferred. Paint was also sprayed into the box through the entrance hole to darken the cavity. The strapping tape made erection of the boxes a simple task. We encountered no problems with the failure of the tape under adverse weather conditions.

The boxes proved durable. We erected 145 boxes along the Tennessee River, Benton and Humphries Counties, TN, in early April, 1984 and checked them at 7-10 d intervals until the study ended in early August. Seasonal temperatures varied from 13 to 38 C. A flood in the study area inundated the boxes for about 10 d at the onset of the study. When

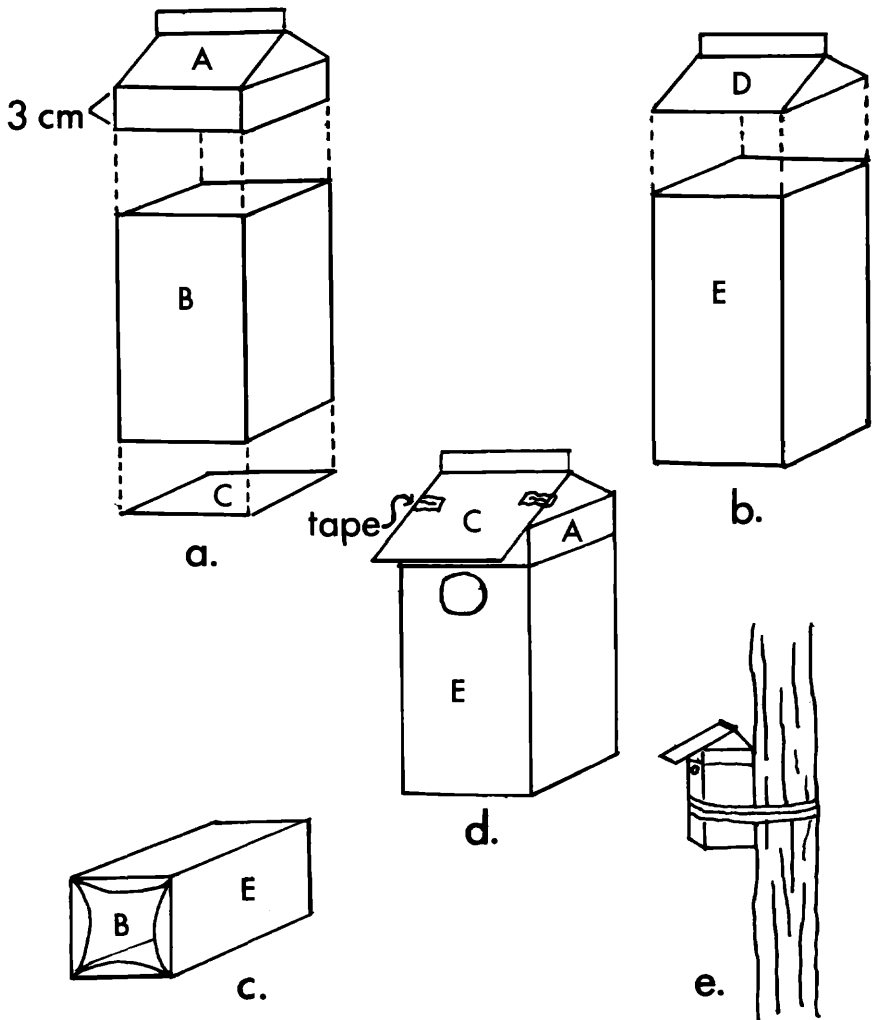


FIGURE 1. Construction of a milk carton nest box for cavity nesting passerines. a, b) Dashed lines show the separation of components cut from milk cartons; c) Part B is forced into E by bowing the sides of B; d) Part C is taped to A to form a roof cap which is forced over Part E, a fastener is not needed; e) attachment to tree with strapping tape.

the water receded, the boxes quickly dried and most remained in good condition. Only 6 of 145 boxes were destroyed (crushed by floating debris) by the flood; 20 roof caps required replacement. In April, 1985 we checked the condition of the boxes put out in 1984. Approximately three-fourths of them were in good condition and many of these were used again by Prothonotary Warblers during 1985.

Prothonotary Warblers readily accepted these boxes as nest sites. Eighty-one (56%) were used by Prothonotary Warblers. Average clutch size was 4.6 eggs. Hatching and

fledging success were not closely monitored but appeared to be good. Predation in nests boxes was a low 1–2%, perhaps because most of the nest boxes were over water and were approached by boat or wading.

We believe these milk carton nest boxes have many applications for field studies of Prothonotary Warblers and perhaps other small cavity-nesting passerines.—W. JAMES FLEMING, *U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20708*, AND DANIEL R. PETIT, *Department of Zoology, University of Arkansas, Fayetteville, Arkansas 72701*. Received 17 Feb. 1986; accepted 15 July 1986.

Deaths of Female Passerine Birds on Their Nests while Incubating.—Nest losses by breeding birds often are attributed to predation of the nest contents, inclement weather, and sometimes to starvation of the young. Nests rarely fail because an incubating parent is preyed upon, dies from exposure during inclement weather, or starves to death (e.g., Ankney and MacInnes 1978, Blackly 1976, Clark 1889, Howell 1941, Kitchin 1925, LaFave 1955, Sawyer 1955). When an incubating bird is lost to a predator, feathers or some other clue often remain at the nest. On the other hand, an incubating parent that dies at the nest of exposure, disease or starvation may be scavenged by a predator along with the nest contents between nest checks, and would be less likely to leave such clues. Thus, the infrequently reported deaths of birds while incubating suggests that such deaths occur either rarely or that their occurrences are overlooked by field workers. Here we report the deaths of 7 female passerines, of three species, on their nests during incubation. Our study area is a 3-km portion of the forested dune ridge, Delta Marsh, Manitoba (see MacKenzie 1982).

On 20 June 1976 a female Western Kingbird (*Tyrannus verticalis*) was found dead on an intact nest, 6.8 m high, that contained a clutch of 6 eggs. This female showed no signs of external injuries, and had been dead 1–2 d when discovered.

A dead female Least Flycatcher (*Empidonax minimus*), showing no sign of external injury, was found on 16 June 1981, on an intact, 5.4-m high nest that contained 4 eggs. The stomach of the slightly decomposed bird was empty, there was no visible subcutaneous fat, and it weighed 10.3 g, which is about average mass for Least Flycatchers during the incubation period in this population (Biermann and Sealy 1985). It is during this period that Least Flycatchers of both sexes are at their lowest weights during the breeding season.

On 26 June 1979 a female Yellow Warbler (*Dendroica petechia*), at least 2 yrs old, was found dead on her intact, 1-m high nest, which contained 4 eggs, 1 egg less than the day before when the completed clutch was present. This female had been incubating 9–10 d when she died, a day or two before the young would have hatched (Goossen 1978). She lacked external injuries and weighed 10.1 g, almost 1 g below the mean mass of incubating older females in this population (Biermann and Sealy 1985). On about 19 June 1984, another female Yellow Warbler, also at least 2 yrs old, died on her 0.3-m high nest. Her nest and clutch of 4 eggs were intact. This female had incubated for about 9 d and also showed no sign of external injury. A double-brooding female Yellow Warbler died on 2 July 1985 at about 1300 h (i.e., rigor mortis had not yet set in) while incubating in direct sunlight (max. 27.5 C that day), about 5–6 d into the incubation of her second clutch, which contained 3 eggs.

A Least Flycatcher was killed by a predator, or possibly died and was scavenged later, on its 3.2-m high nest on 17 June 1983; its head and one wing were on the ground under the nest while the tail and feet were in the empty, intact nest. On 13 June 1984, another dead Least Flycatcher was found in a nest that contained a clutch of 4 eggs that had been completed 4 d earlier. This nest, 5.2 m high, was active 24 h earlier. The bird, probably a female because males have not been observed incubating in this population (Briskie, pers. obs.), had a 2-cm long wound in its abdomen. The clutch was still intact in the slightly disturbed nest.

One and possibly two of the Least Flycatchers were killed on their nests by predators, or died there and were scavenged later. Causes of death in the 5 other individuals are not known for sure. Each bird could have died from disease, but none of the birds was necropsied. We suspect, however, that if disease-caused mortality occurred regularly during the breeding season on our study area, we would have found over the years other dead adults