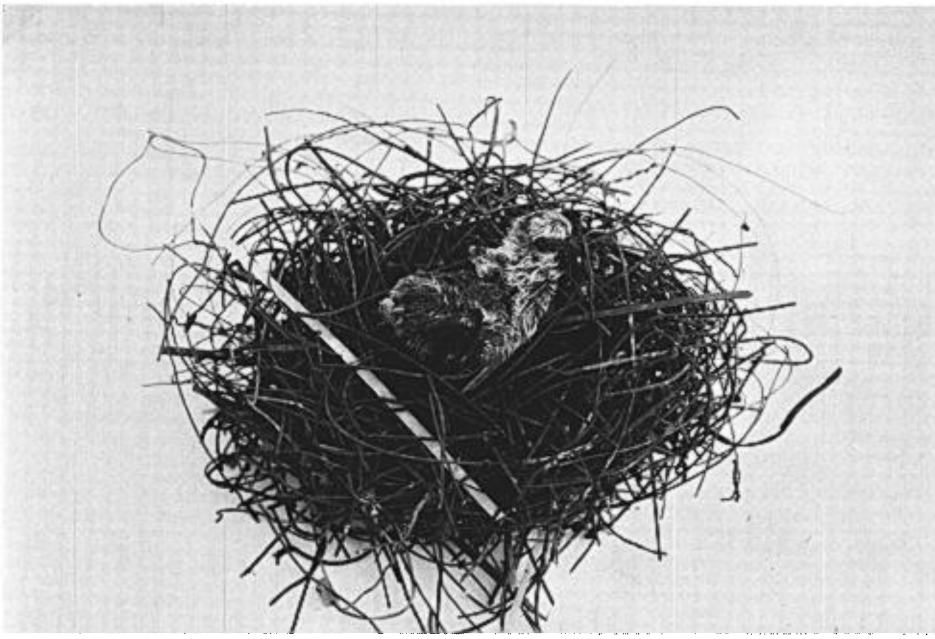

Fig. 1. Rock Dove nest constructed primarily of wire.

(3%), 1 pipe cleaner, and 3 feathers comprising the remainder. The plant material was mainly wood splinters. The nest was 12.0 cm high and 23.0 cm in diameter and weighed 617.5 g. In construction it was similar to other Rock Dove nests. Although material had been added one piece at a time and the nest was not well woven, it could be lifted without falling apart. The noncompressibility of the wire explains the nest's unusual height. The longer wire (> 16.0 cm) and plastic debris were at the base and sides of the nest, while smaller bits of wire (< 9.0 cm) and plant material comprised the center of the nest. According to Nowland (pers. comm.) many pieces of wire were scattered on the ground within several hundred meters of the nest site. The nearest vegetation was approximately 400 m away.

Bent (1948, U.S. Natl. Mus. Bull. 195) mentions that House Wrens (*Troglodytes aedon*) have been known to build nests exclusively of metal, but he does not discuss the success of these attempts. Possibly this nest failed because it provided no insulation to help retain the heat generated by the brooding adult, and any metabolic heat produced by the squab was probably drawn off via conduction. I thank R. S. Nowland and R. V. Dietrich, who found and donated the nest, respectively.—ROBERT L. PATERSON, JR., *Department of Biology, Central Michigan University, Mt. Pleasant, Michigan 48859.* Accepted 10 Oct. 76. This note was subsidized by Central Michigan University's Faculty Research and Creative Endeavors Grant #20-21315.

Red-cockaded Woodpeckers and pine red heart disease.—The Red-cockaded Woodpecker (*Picoides borealis*) is unusual for its consistent use of living pine trees as cavity sites. Steirly (1957) attributed the ability of these woodpeckers to use living pines to the presence of red heart disease (*Fomes pini*), a fungus that weakens the heartwood and thus facilitates excavation. Some authors (e.g. Steirly 1957; Ligon *in* Thompson 1971: 30) have maintained that red heart disease is necessary for the woodpeckers to excavate a cavity successfully while others (e.g. Beckett *in* Thompson 1971: 87) have suggested that the Red-cockaded Woodpeckers' use of pines with red heart disease is merely a function of the age of trees, rather than a requirement for excavation. The purpose of this paper is to present data on the incidence of red heart in Red-cockaded Woodpecker cavity trees and to clarify the relationship of the disease to tree use by the birds.

During 1972 and 1973 I located 265 Red-cockaded Woodpecker cavity trees on Noxubee National Wildlife Refuge and the Mississippi State University Forest in Noxubee, Winston, and Oktibbeha Counties in Mississippi. The upland forest there is second growth consisting of mixed pines and hardwood. The dominant pines are loblolly (*Pinus taeda*), with occasional scattered shortleaf pines (*Pinus echinata*). All but

TABLE 1

CHARACTERISTICS OF RED-COCKADED WOODPECKER CAVITY TREES IN EAST-CENTRAL MISSISSIPPI

	N	Mean	Range	SD
Tree height (m)	258	29.8	16–40	3.8
Tree age (years)	259	75.9	40–116	12.1
dbh (cm)	246	60.4	26–87	9.9
Bark thickness (mm)	259	23.2	9–45	5.8

one of the cavity trees were loblolly pines; the exception was a shortleaf pine. Each of the 615 cavities in these trees was classified in one of four categories: (1) fresh—wet pine gum on the tree flowing from "resin wells" around a fully excavated cavity; (2) dry—dried, white pine gum around a fully excavated cavity; (3) old—blackened and deteriorating pine gum around a fully excavated cavity; (4) cavity start—not a fully excavated cavity and generally with no active or inactive resin wells and no appreciable gum present on the tree around the entrance. Where possible, I recorded the following information for each cavity tree: (1) tree height in meters, measured with a Haga altimeter; (2) tree age, measured by increment boring at 1.5 m and adding 3 years to the counted annuli; (3) tree diameter (dbh) in centimeters (at 1.5 m); (4) bark thickness at breast height, measured in mm with a bark thickness gauge; (5) presence or absence of red heart at 1.5 m and at cavity height, determined by increment boring and sometimes also by the presence of conks (fruiting bodies of the fungus). The increment boring samples from trees with red heart disease end with soft, friable, infected wood of a dark red color. I considered culturing of increment bore samples unnecessary as no other trunk rot of these pines has been reported (Hepting 1971: 367). Estimates of tree age were often difficult when red heart was present at 1.5 m. Age, dbh, and presence or absence of red heart at 1.5 m and at 10 m were also measured for 40 loblolly pines that were within woodpecker colonies and that looked similar to cavity trees but had no woodpecker cavities.

Basic statistics for cavity tree characteristics were calculated using UNIVAR, a Fortran computer program written by D. M. Power. Analysis of variance or a test for equality of two percentages (Sokal and Rohlf 1969) was used to compare data sets at the 0.05 level.

The characteristics of all cavity trees and trees with and without red heart disease are summarized in Tables 1 and 2. Most trees with completed cavities (90%) had obvious signs of red heart disease, while 67% of the trees without red heart contained only cavity starts. Those cavity trees with red heart disease, while apparently averaging only 6.2 years older than those without the disease, in fact probably averaged at least 8 to 10 years older as red heart had frequently destroyed inner annual rings. The diseased trees also were significantly less in diameter and had thinner bark than healthy cavity trees. At 1.5 m and at cavity height, the lowest incidence of red heart disease was in trees with only cavity starts (Table 3). In each case, this level of incidence was significantly lower than the incidence for trees with fully excavated cavities. Incidence of red heart at cavity height was nearly double that at 1.5 m.

The 40 noncavity trees measured within Red-cockaded Woodpecker colonies averaged 67.8 years old, 49.0 cm dbh, and 21.8 mm bark thickness. None showed a trace of red heart disease at either 1.5 or at 10 m. Few large pines were available that were not being used as cavity trees by the birds, hence the lower age and size of trees in this sample. It is significant that the range of measurements for the 40 trees without cavities fell entirely within the range for cavity trees, and that cavity trees within and below the range for trees without cavities had a high incidence of red heart.

TABLE 2

CHARACTERISTICS OF RED-COCKADED WOODPECKER CAVITY TREES WITH AND WITHOUT RED HEART DISEASE EVIDENT AT CAVITY HEIGHT

	With red heart			Without red heart		
	N	Mean	SD	N	Mean	SD
Tree height (m)	153	28.9	3.7	50	29.4	3.4
Tree age (years)	152	77.0	11.6	50	70.8	12.0[1]
dbh (cm)	153	57.2	9.4	50	64.1	7.9[1]
Bark thickness (mm)	148	21.8	5.5	50	24.6	5.5[1]

[1] Significant difference ($P \leq 0.05$) between trees with and without red heart disease.

TABLE 3

INCIDENCE OF RED HEART DISEASE IN RED-COCKADED WOODPECKER CAVITY TREES

	Cavity status			
	Start	Fresh	Dry	Old
At 1.5 m				
N (trees)	92	88	32	53
RH (%)	30.4	38.6	37.5	45.3
No RH (%)	67.4	60.2	59.3	50.9
Uncertain (%)	2.2	1.1	3.1	3.8
At cavity height				
N (cavities)	387	101	61	66
RH (%)	55.3	73.3	77.1	68.2
No RH (%)	36.4	12.9	4.9	9.1
Uncertain (%)	8.3	13.8	18.0	22.7

Early stages in the development of red heart disease are not detectable by gross examination of increment bore samples. Further, infected wood could be virtually removed by the bird's excavation. Considering only these possibilities and the high percentage of bore samples for which the presence or absence of red heart disease was uncertain, it would seem possible that the presence of red heart is requisite for the Red-cockaded Woodpecker's existence. Other evidence increases the probability that the birds require weakened heartwood for their excavations. Affeltranger (*in* Thompson 1971: 96) states that the spores of *Fomes pini* are wind disseminated and that inoculation must occur on branches with heartwood or where large wounds are present in the trunk. These woodpeckers may spend a year or more excavating a cavity, at times leaving the excavation untouched for months (Baker *in* Thompson 1971: 44; pers. obs.). This behavior, associated with the fact that the lowest incidence of red heart disease was found in trees with only cavity starts, suggests that the birds may excavate only until they reach sound heartwood and that the cavity start may provide a site for infection, after which the woodpeckers complete excavation.

The lesser dbh and bark thickness noted for cavity trees with red heart when compared to cavity trees without red heart is likely symptomatic of the disease. On the other hand, the birds' characteristic flaking of bark from active trees may account for some difference. Scaling of bark from noncavity trees while the birds forage may facilitate infection by red heart to the extent that it makes the tree more susceptible to mechanical injury.

Finally, the minimum incidence of red heart disease in the Red-cockaded Woodpecker cavity trees discussed here (75%) is significantly higher than the 2 to 40% incidence reported for loblolly pines from other areas (Nelson 1931, Hepting and Chapman 1938, Gruschow and Trousdell 1958). The relationship between the birds and the fungus does not seem to be one of chance coexistence. The presence of red heart is probably required for the normal, complete excavation of cavities by Red-cockaded Woodpeckers and infection of pines by red heart is probably facilitated by the birds' activities.

For this woodpecker to recover from its endangered status (Jackson *in* Thompson 1971: 4) we must provide the older trees that are naturally susceptible to red heart disease or we must begin a program of artificially infecting younger pines (Affeltranger *in* Thompson 1971: 96) in hope that the birds will make greater use of them for cavities. The latter course seems remotely feasible as a few nest cavities have been found in trees approximately 40 years old in diverse parts of the bird's range (e.g. Florida—Ligon 1970, Crosby 1971; South Carolina—Hopkins and Lynn *in* Thompson 1970: 140; Mississippi—pers. obs.). The former course of action is the only course that could result in anything more than a "showcase" population. Unfortunately, present management guidelines for our national forests (where I estimate 75% of existing Red-cockaded populations occur) include a 60-year rotation for loblolly pine, an 80-year rotation for longleaf pine (*Pinus palustris*), and similar rotations for other southern pines (M. Lennartz pers. comm.). These rotations were established to maximize timber production and minimize losses to such factors as red heart disease. It is no accident then that each pine species is harvested before it reaches the prime age for red heart (Hepting 1971) and cavity excavation by these woodpeckers (Thompson and Baker *in* Thompson 1971: 170). The U.S. Forest Service is developing new management guidelines for the Red-cockaded Woodpecker (Holbrook pers. comm.) and hopefully these will allow for expansion of the species into new areas as well as for maintenance of the existing fragmented populations.

I am grateful for the assistance of several students who worked with me on Red-cockaded Woodpeckers and for the cooperation and assistance received from personnel at Noxubee National Refuge during the past

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Unusual food item of Franklin's Gull.—Investigations on the ecology of birds are necessary for their conservation, and food habits data seem justified in adding to the total ecological picture. While preparing a museum study skin (DLD 159) of an adult (sex unknown, weight 325 g) Franklin's Gull (*Larus pipixcan*) collected by the first author on 1 October 1972 at the Maryville sewerage lagoons, Nodaway County, Missouri, we found 23 stinkbugs (Pentatomidae) and one large adult prairie vole (*Microtus ochrogaster*) in the crop, and one adult western harvest mouse (*Reithrodontomys megalotis*) in the gizzard. The Franklin's Gull is considered to be almost completely insectivorous and the stinkbugs were not surprising although Bent (1921, Life histories of North American gulls and terns, Washington, USNM Bull. 113: 170–171) does not specifically mention these insects. The mice were surprising; the only reference we have been able to find on any vertebrate foods of this gull is Bent (op. cit., 171) who speculates that possibly small fish might be eaten. The feeding habits of this "prairie" gull during migration are well known as it often follows the farmer and plow during spring and fall to feed upon freshly exposed grubs and worms. During this time other animals such as mice are frequently exposed by the plowing and subject to heavy predation. The habit of hawks following a plowman are well known. Evidently the Franklin's Gull is an opportunistic feeder and will sometimes consume vertebrates such as mice. It is not known whether this individual was a scavenger or a predator, but the consumption of two fresh mice at the same time makes us suspect predation. The intact prairie vole was a particularly large individual; we marveled that so large an item would be swallowed whole.—DAVID A. EASTERLA AND DOYLE L. DAMMAN, *Department of Biology, Northwest Missouri State University, Maryville 64468.* Accepted 29 Sep. 75.

The Greater Shearwater in the northern Gulf of Mexico.—The first record of this shearwater (*Puffinus gravis*) from the Gulf of Mexico was not from Galveston on 4 November 1973, as claimed by Arnold (1975, Auk 92: 394), but from Dog Island near St. Marks, Florida on 29 January 1950, specimen in Florida State University, H. M. Stevenson (1950, Florida Naturalist 23: 71). Arnold wrote that this shearwater is "known from the United States only along the Atlantic coast from eastern Florida northward" (Murphy 1967, Serial atlas of the marine environment: Distribution of North Atlantic pelagic birds, map 8B, Amer. Geogr. Soc.) and that he has been "unable to locate any other records for the Gulf coast of the United States or for any other part of the Gulf of Mexico region."

After 1950 the species was recorded in the northern Gulf of Mexico in 1958, 1964, 1966, 1970, 1971, 1972, 1973, and 1974. In 1975 Purrington (Amer. Birds 29: 69) remarked that "these observations lend substance to the conclusion that the Greater Shearwater probably occurs annually along the n. Gulf coast."