

porting studies at Belém. I appreciate the help of my husband, Edwin Willis.

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NO EVIDENCE FOR INCUBATION PATCH CHANGES IN MOURNING DOVES THROUGHOUT REPRODUCTION

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Male and female Mourning Doves (*Zenaidura macroura*) possess a bare ventral apterium throughout the year. Both the female and male birds participate in incubating the eggs and caring for the young, but whether they develop an incubation patch has not been established. At times it has been assumed that pigeons and doves possess an incubation patch similar to some passerine species (Bailey 1952; Eisner 1960), but no direct evidence of tissue changes in the ventrum of doves has been shown.

As a part of a preliminary investigation of wild Mourning Doves to determine the interrelationship between organ and tissue changes and hormonal secretions during the nesting cycle, 17 female and 14 male adults were collected May-August 1968 in rural areas about 10 miles W of the city limits of Omaha, Nebraska. The interval of the reproductive cycle studied was divided into four periods for analysis: mated and egg-laying birds and 1-6 days incubation; 7-15 days incubation; 1-6 day nestlings; 7-15 day nestlings. Anterior and posterior sections of ventral apterium were taken 1 cm from each end of the sternum and histologically examined. The following measurements were made to the nearest 2.5 μ at randomly selected positions on the cross sections of ventral apterium stained with hematoxylin and eosin: (1) thickness of the stratum germinativum and cornified layers; (2) number of cell layers in the stratum germinativum; (3) thickness of the dermis layer; (4) number of blood vessels over 10 μ in diameter per mm; and (5) diameter of the blood vessels greater than 10 μ in diameter.

The mean length and width of the ventral apterium of the males was 22 \times 65 mm, and of the females, 26 \times 58 mm. This area in both males and females was always bare and never appeared to have possessed feathers. The apterium extended from the thoracic inlet to the abdomen in all the birds, so that the length was primarily dependent on the size of the bird.

No consistent trends were seen in the number of layers of the stratum germinativum or in the number or size of blood vessels. The number of layers of the stratum germinativum ranged, usually, between 2 and 4. Measurements of the number of blood vessels and the thickness of the dermis layer were subject to error. Most of the large blood vessels were in the lower part of the dermal layer and some of these vessels were damaged in sectioning. Consequently no definitive statement on the number of blood vessels can be made. Examination of both the anterior and posterior sections of the ventral apterium did not reveal any significant or consistent trends in the thickness of the stratum germinativum or dermis layers during any particular part of the nesting cycle that was studied (table 1).

Bailey's (1952) study of the incubation patch formation in passerine birds given various hormone injections established that in some passerines the incubation patch develops in response to a combination of estrogen and prolactin. Estrogen alone produced vascularization while prolactin when administered alone had no effect. From histological studies, Bailey characterized formation of the brood patch as involving defeathering, vascularization, and edema. Hinde and Steel (1964) studied the tactile sensitivity of the Canary (*Serinus canarius*) incubation patch and found that the ventral surface becomes more sensitive to tactile stimulation as the breeding season advances. Injections of estrogen with prolactin or progesterone reportedly caused a decrease in the tactile sensitivity threshold. Consequently increased tactile sensitivity may also be characteristic of the incubation patch in some birds. R. E. Jones (pers. comm.) has recently found nerve receptors in the incubation patch of the California Quail (*Lophortyx californicus*).

It has been suggested that in species in which males possess an incubation patch, androgen may stimulate its development. Johns and Pfeiffer (1963) gave injections of estradiol, testosterone, and prolactin in various combinations to male and female Wilson's Phalaropes (*Steganopus tricolor*). In this species only the male builds the nest, incubates the eggs, and broods the young. They found that only testosterone and prolactin in combination produced incubation patches in all birds, both male and female.

Prolactin is apparently essential to the complete formation of the incubation patch in many species (R. E. Jones, in press). Mourning Doves examined in this study exhibited an increase in prolactin activity during the incubation period as evidenced by crop sac development. Despite the evidence of prolactin secretion following gonadal activity (during which estrogen or testosterone would be abundant) there was no evidence of tissue proliferation or edema in the ventral apterium of the doves.

TABLE 1. Measurements (mean μ) of the ventral apterium of male and female Mourning Doves.

Sex and reproduction period	n		Stratum Germinativum			Dermis		
	Ant.	Post.	Ant.	Post.	Mean	Ant.	Post.	Mean
Males								
Mated and egg-laying birds;								
1-6 days incubation	4	4	6.5	8.0	7.2	65.9	132.5	99.2
7-15 days incubation	4	2	9.7	8.0	8.8	76.0	75.0	75.5
1-6 day nestlings	1	1	10.0	6.3	8.1	67.5	112.5	90.0
7-15 day nestlings	5	4	7.8	7.5	7.6	61.4	117.5	89.4
Females								
Mated and egg-laying birds;								
1-6 days incubation	5	3	6.6	10.0	8.3	59.6	100.0	79.8
7-15 days incubation	5	4	10.8	7.5	9.1	93.8	97.5	95.6
1-6 day nestlings	4	4	8.7	11.0	9.8	73.8	90.0	81.9
7-15 day nestlings	3	3	9.4	8.0	8.7	72.5	110.0	91.2

If the Mourning Dove does develop an incubation patch, it is anatomically meager compared to the incubation patch of many passerine species. In this study no criterion of incubation patch formation enumerated by Bailey, nor any indication of change in the ventral apterium during incubation could be established. This does not dismiss the possibility of a change in the number of nerve endings or in the sensitivity of nerves in the incubation patch area.

It is interesting that the Mourning Dove is capable of incubating eggs in the absence of a hypertrophied incubation patch, and that this incubation not infrequently takes place on a nest weak in insulation qualities and at low ambient temperature.

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THE STATUS OF *CARPODACUS MCGREGORI*

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Analyses of the evolutionary dynamics of island faunas require data on rates and times of immigration and extinction. Because these processes are rarely monitored, such data are meagre. This paper summarizes what little is known of the history of the McGregor House Finch (*Carpodacus mcgregori*), an island endemic known as a breeding bird only from the San Benito Islands, Baja California. These three desert islands together encompass an area of about five square miles and lie some 40 miles NW of the nearest point on the peninsula of Baja California and 15 miles W of Cedros Island, the nearest land.

The status of this species has been a matter of some concern from the time of its discovery in 1896, and in recent years its extinction has been rumored (Banks 1964). Greenway (1958) did not mention it in his book on extinct and vanishing birds, and Vincent (1968) was unable to document its current

status. Anthony (1897) considered *Carpodacus mcgregori* "rare" on West San Benito Island at the time of its discovery in 1896, and, in view of the sparse vegetation of the islands, he was surprised (p. 166) "that a species of this genus should be found there at all." Kaeding (1905) stated that it was "practically extinct" in 1897. According to Anthony (1925:279), the species was common enough in 1898 that "one might have easily collected a dozen . . . in an hour," but the accuracy of this remark, written nearly three decades after the original observation, may be open to question. In 1922, however, Anthony (1925:298-299) found the species "so nearly extinct that I doubt another specimen being taken for science." In two days, four persons were able to collect one specimen and they observed only one additional bird. Grinnell (1928:155) stated that it was "formerly common but now rare," but gave no data to support his interpretation of its then current status. Several years later Bancroft visited the islands and found (1932:89) that it seemed to be "holding its own"; he estimated the population on the two large islands to total 25 individuals. (Middle San Benito Island is hardly more than a sand bar and offers no habitat suitable for house finches.) The exact date of Bancroft's observations is unstated but doubtless was in 1932, for a set of four eggs in the collection of the Western Foundation of Vertebrate Zoology was taken by Bancroft on