CAVE SWALLOWS IN BIG BEND NATIONAL PARK, TEXAS

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In January 1969, Davis found nests within a cave he was exploring on Mariscal Mountain, Big Bend National Park, Brewster County, Texas. On 27 May, the authors visited the area and found 13 Cave Swallows (*Petrochelidon fulva*) and four or five Cliff Swallows (*P. pyrrhonota*) flying in a mixed flock outside the cave entrance. A total of 18 Cave Swallow nests was located within the cave, 60–70 ft back from the entrance; two nests contained young birds and a third contained four eggs. All of the nests were located along cracks within the domed ceiling 6–8 ft above the floor. Several discarded egg shells were collected and the nests were photographed. Two active Cliff Swallow nests were found at the cave entrance. A second cave nearby contained several inactive Cave Swallow nests in its twilight section. The caves were examined again on 17 July by David Easterla (pers. comm.), who found 20–25 birds at the caves and three more active nests in the first cave. In May and July 1970, Cave Swallows were again found nesting there.

Mariscal Mountain is a massive, limestone, anticlinal ridge situated at the "bottom" of the Texas Big Bend. The caves are located at 2300 ft elevation on the eastern side of the high cliff-face, slightly less than one mile from Solis on the Rio Grande. The cave entrances are elevated 300 ft above the adjacent xeric flats. Number and apparent ages of the nests indicate the Cave Swallow has nested on Mariscal Mountain for at least several years. Availability of mud is assured by the adjacent Rio Grande.

These data represent the first record of Cave Swallows nesting within Brewster County. Baker (pers. comm.) has recorded it within the Glass Mountains, approximately 75 miles NE of Big Bend National Park, and Selander and Baker (Condor 59:345, 1957) summarized its occurrence in Texas. It also is the first record of Cave and Cliff Swallows nesting within the same cave, although Whitiker (Condor 61:369, 1959) found Cave and Barn Swallows (*Hirundo rustica*) nesting together in a building near Cuartro Cienegas, Coahuila, México, and Baker (Condor 64: 326, 1962) said that this was of regular occurrence at villages throughout "the arid regions of north-central México," and reported all three swallows nesting in the same building.

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PARENTAL ACCEPTANCE OF YOUNG AS A FUNCTION OF INCUBATION TIME IN THE RING-BILLED GULL

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The orderly progression of the reproductive cycle of birds depends upon a number of physiological changes that affect not only the reproductive organs but also the behavior of the breeding individual. It is now known, for instance, that the sequence of behavior patterns occurring as the cycle proceeds through the sexual and nest-building phases to egg-laying and incubation is governed by a series of hormonal changes, induced in part by stimuli received from mate, nest, and eggs (Eisner 1960; Hinde 1965; Lehrman 1965). Results of exogenous hormone treatment give reason to suspect that the transition from incubation to parental care of the young also depends upon a shift in hormonal levels, but little information is available as to when the critical adjustments are completed in the normal flow of the cycle. This matter, as regards the natural breeding cycle of the Ring-billed Gull (*Larus delawarensis*), was investigated in an experiment reported here which tested the responses of incubating adults to chicks introduced into the nest at various stages of the incubation period.

Ring-billed Gulls breed in dense colonies wherein each nesting pair establishes an exclusively held territory of about 1–4 m^2. The female lays a clutch of two to three eggs over an interval of 3–5 days. Incubation begins with the laying of the first egg and extends over a 23–26-day period before the chicks begin hatching. Both parents participate in incubating the clutch and in brooding and feeding the young.

I performed the experiment in a large colony located on a peninsula protruding into Lake Huron at Rogers City, Michigan. Nesting activity within the colony varied widely enough to enable me to use chicks from the earliest breeders for testing later nesting pairs. Twenty-four such pairs each received a single standard test given between the 3rd and 20th day of incubation as determined from the date that the first egg of the clutch was laid. As this date differed by as much as 2 weeks within the sample, care was taken in conducting tests to vary the stage of incubation independently of laying date, so that possible variation in acceptance related to chronological differences in nesting onset would be well distributed along the postlaying baseline. The test procedure, already known to be effective in eliciting parental behavior in this species (Emlen and Miller 1969), consisted simply of replacing the eggs with two freshly hatched chicks. The exchange was immediately followed by 3–5 hr of observation through 7 × binoculars from a car parked near the colony. Nests with chicks surviving this period were repeatedly surveyed on subsequent days to ascertain whether the parents persisted in tending the chicks or later abandoned them.

Table 1 shows the stage and results of each test performed. Birds incubating eggs for one week or less were quite unreceptive to the chicks, accepting and continuing to care for them in only one of the nine test cases. Two others were observed to brood the chicks temporarily, but their apparent lack of attentiveness resulted in the chicks dying or wandering off within 24 hr. In six tests the attending adults rejected the chicks outright, either by killing them,

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TABLE 1. Results of acceptance tests at individual nests of Ring-billed Gulls at various stages of incubation (days from laying of first egg).

Stage of incubation (days)	Responses (first observ. period)[a]		Eventual outcome	Days known to tend chicks
	Initial	Terminal		
3	Pkd	Des	Des	0
4	Pkd	Des	Des	0
5	Pkd	Brd	Neg	<1
5	Pkd	Brd	Neg	<½
5	Ref	Ref	Neg	0
6	Pkd	Brd	Acc	2
7	Pkd	Des	Des	0
7	Ref	Ref	Neg	0
7	Pkd	Des	Des	0
8	Pkd	Des	Des	0
8	Pkd	Brd	Acc	7
8	Pkd	Des	Des	0
8	Brd	Brd	Acc	5
9	Pkd	Brd	Acc	6
10	Ref	Brd	Acc	4
11	Brd	Brd	Acc	2
12	Pkd	Brd	Acc	3
12	Brd	Brd	Acc	6
12	Brd	Brd	Acc	10
13	Brd	Brd	Acc	2
13	Pkd	Brd	Acc	7
15	Brd	Brd	Acc	10
18	Pkd	Brd	Acc	10
20	Brd	Brd	Acc	4

[a] Pkd, pecked chicks; Brd, brooded chicks; Ref, refused to approach nest; Des, destroyed (killed or ejected) the chicks; Neg, neglect (failed to retain chicks or keep them alive); Acc, accepted and continued to care for the chicks.

flinging them from the territory, or refusing to approach and sit on the nest.

The incidence of permanent acceptance increased sharply early in the second week of incubation. In two of the four tests given on day 8 and in all 11 given at later stages, the adults accepted and, when last observed 2–10 days later, were still tending the chicks.

These results require comment concerning the sample of birds tested, as this necessarily came from the later nesting segment of the colony. In many avian species this segment contains pairs renesting after an earlier abortive attempt. In testing this possibility in one of his study colonies of Ring-billed Gulls, Vermeer (1970) removed the eggs from 154 nests and afterward found only one new clutch appearing in the colony, suggesting that renesting is a rare phenomenon in this species. Since the breeding progress and success of young birds undergoing their first nesting season are often retarded, the low incidence of acceptance found in the early stages of incubation perhaps relates to a lack of breeding experience on the part of the individuals tested at this time. However, unless inexperienced birds happened by some remote chance to comprise only this portion of the sample, an explanation for the subsequent increase in acceptance must be sought elsewhere.

While the possibility cannot be entirely excluded that this increase applies only to gulls beginning to nest relatively late in the breeding season, it bore no relationship to the variation in laying dates within the sample. Thus it is interpreted here as reflecting a change in the physiological state of incubating adults brought about, perhaps, by hormonal adjustments made during the first week of incubation. The hormone mentioned most frequently in connection with parental behavior of birds is prolactin. Studies of Ring Doves (*Streptopelia risoria*) definitely implicate this hormone in the parental feeding of squabs and further indicate that its secretion is augmented by stimulus input from the eggs (Lehrman 1965). Moreover, an increased pituitary production of prolactiin during the early part of the incubation period appears to be a precedent condition to the acceptance of young by incubating Ring-necked Pheasants (*Phasianus colchicus*) in their first nesting season (Breitenbach et al. 1965). Although it presently would be premature to conclude that the increased parental receptiveness found in the present study was due to enhanced prolactin output, such an account seems a reasonable hypothesis.

Whether or not the results obtained in this study are typical of seasonally breeding avian species remains to be determined. Other studies examining parental responses to young presented prematurely in the breeding cycle have yielded varying results. Work by Lashley (1915) and Goethe (1953) suggests that Sooty Terns (*Sterna fuscata*) and Herring Gulls (*Larus argentatus*) also fail to accept chicks during early stages of incubation. On the other hand, acceptance during or immediately following egg-laying has been reported by Emlen (1941) in Tricolored Redwings (*Agelaius tricolor*), by Paludan (1951) in Lesser Black-backed Gulls (*Larus fuscus*), and by Beer (1966) in Black-headed Gulls (*Larus ridibundus*). It seems evident that more species will have to be examined under a wide variety of circumstances before generalizations can be formulated.

SUMMARY

Incubating gulls accepted and continued to care for chicks that were introduced into the nest after the

8th day of incubation. The reluctance of adults to do so before this time suggests that they had not yet become physiologically prepared for the final parental-care phase of the reproductive cycle.

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SPASMODIC TIC, A BEHAVIORAL TRAIT OF THE CRACIDAE

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This study was initiated in 1966 when it was observed that the curassows contained in the St. Louis Zoo collection exhibited a nervous twitching of the head. After observing other collections, particularly those of the Houston Zoo and the private collection of Mr. Mickey Ollson in Glendale, Arizona, it was apparent that this behaviorism is characteristic of cracids in general. This spasmodic tic had been noted among other birds, but never on a regular basis or involving a number of individuals of a species. The tic is simply a nervous side-to-side twitch of the head and upper neck, with the head slightly tilted. John O'Neill (pers. comm.) describes the tic of the Nocturnal Curassow (*Nothocrax urumutum*) as follows: "It differs from the typical tic of *Penelope* in that instead of being from side to side it is a back and forth movement combined with rapid head shaking. I can best describe it as the motion that a human goes through when suddenly surprised. The head is jerked back quickly and slightly upward. It is then returned to the forward position with no interruption. When the head is being returned to the original position the bird may or may not give a series of quick side to side jerks. These jerks may be described as the type of movements given by a bird when bothered by an insect." The twitch is more evident when a bird is excited or feeding and it is most evident in *Crax* and *Mitu*. Initially, we thought that this could indicate a dietary deficiency, so we began inquiring among colleagues in order to find if they had noted this behavior in their collections or in the field. We received much evidence supporting our observations.

This spasmodic tic is not the false preening mentioned by Heinroth (J. Ornithol. 79:278, 1931); it does not involve throwing the head back nor deal with any part of the anatomy save the head and neck.

Thus far we have noticed this tic in 26 species of nine genera of cracids. Of the two remaining genera, *Oreophasus* and *Penelopina*, Robert F. Andrle (pers. comm.) says that he recalls observing this twitching in *Aburria* and possibly noted it in *Oreophasus* while feeding in the wild. Dr. J. Estudillo (pers. comm.) also noted the tic in *Oreophasus*.

This tic has also been observed in juvenile birds only a few days old. Charles Cordier (pers. comm.) noticed this tic in feral cracids. He suggested that it may be an adaptation for repelling annoying insects. Since this time, Amadon (pers. comm.) writes me that Dr. Helmut Sick informed him that the eyes of curassows are often infested with parasitic nematodes which live beneath the lids and nictitating membranes. He further states that curassows became nervous when small flies, which probably spread these parasites or their eggs, buzz around their heads. Amadon then writes that Prof. H. Stunkard, a parasitologist, regards it as likely that these parasites may be spread in this manner.

On the other hand, the head tic, which in captive birds at least seems to occur in situations of stress, may have nothing to do with insects or parasitism. It may be a displacement mannerism or have some other function. Prof. A. Stokes (letter to Amadon), for example, found that in a captive pair of Salvin's Curassows (*Mitu salvini*) it occurred in association with courtship feeding.

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