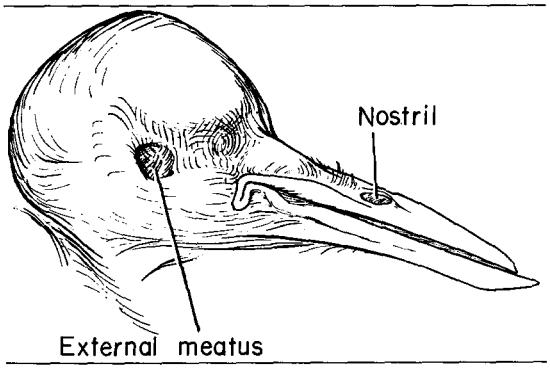

FIGURE 1. Lateral view of the plucked head of an eyeless American Robin.

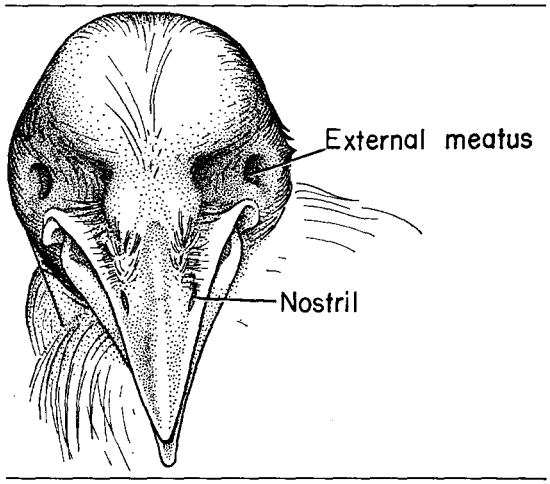

FIGURE 2. Frontal view of the plucked head of an eyeless American Robin.

recognizable embryo. On 20 June, the normal nestling weighed 51.6 g; the eyeless nestling weighed 51.7 g. These are normal weights for Robins at eight days of age.

Mrs. Howard returned to the nest on 23 June, finding the normal bird crouched down in the nest and the eyeless robin on the ground about two feet from the forsythia nest-bush. She put the eyeless Robin on the lawn and watched it from her car. The eyeless bird had difficulty maintaining its balance and repeatedly fell to one side or the other. Nevertheless, the bird was able to preen its feathers several times. The female fed the recently fledged eyeless bird once, and the fledgling also gaped twice when the female flew close to it. Mrs. Howard collected the eyeless bird that day and preserved it in 10 per cent formalin.

Figure 1 is a lateral view of the plucked head of the bird (it appeared normal except for the head). The upper mandible was slightly shorter than the lower mandible. A potential eye-slit between the incipient eyelids was about 1 mm in maximum length in the anteroposterior direction bilaterally. Figure 2 is a frontal view of the plucked head.

Because palpation revealed no suggestion of eyeballs on either side of the head, gross dissection was not attempted. The entire head was sectioned from the base of the bill posteriorly through the brain. These slides revealed the complete absence of eyeballs bilaterally, as well as the absence of any well-defined bony orbits.

Coulombre and Crelin (J. Phys. Anthro. 16:25–37, 1958) studied the role of the developing eyes in the morphogenesis of the bird skull. They reported that the growing eye exerts a mechanical influence on the morphogenesis of the chick's orbit, and that the alignment of the axes of the upper beak and the head is dependent, in part, on equal expansion of the two eyes.

In the present instance, both the eyes and the normal orbital configuration are absent. Nevertheless, the malformation of the two mandibles would appear to be minimal.

We are indebted to James I. Kendall for preparing serial sections and microphotographs of the head of the specimen, and to Mrs. Barbara Downs for the pen-and-ink sketches.

The serial sections have been deposited with the Armed Forces Institute of Pathology, Washington, D.C.

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STARVATION OF SPRING MIGRANTS IN THE CHIRICAHUA MOUNTAINS, ARIZONA

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Although in small birds death by starvation is rarely observed in nature, Lack (Population studies of birds, Oxford Univ. Press, 1966:280) believes that "starvation outside the breeding season is much the most important density dependent factor in wild birds. . . ." Most evidence supporting this contention indicates that it is the young of the year that suffer heaviest losses. Observations reported below suggest that starvation may occur among some spring migrants in years in which there is a late period of cold.

TABLE 1. Minimum air temperatures at the Southwestern Research Station for the first four days of May in a three-year period.

	Minimum temperature, °F		
May	1965	1966	1967
1	40	33	23
2	41	42	20
3	39	49	27
4	34	37	30
Mean	38.5	40.2	25.0

In early May 1967 an unusual freeze (table 1) killed much of the new deciduous foliage in the Chiricahua Mountains, Cochise County, Arizona. The effects of this temperature drop on some of the small insectivorous birds were apparent several days later (13–16 May) during our stay at the Southwestern Research Station of the American Museum of Natural

TABLE 2. Weights (in grams) of male Western Tanagers.

	n	Range	Mean
14 May (first capture)	27	25.6–37.6	27.70
15 May (recaptures)	4	23.1–27.3	25.05
15 May (first capture)[a]	5	30.0–38.1	32.18

[a] That most of the tanagers captured on 15 May were recent arrivals is suggested by the relative commonness of females on that date. Four were captured on 15 May (weights, 31.1–32.9 g). On the previous day only one female was seen or captured (her weight was 26.1 g).

History, which is located in Cave Creek Canyon of the Chiricahuas. Here Western Tanagers (*Piranga ludoviciana*) and Black-headed Grosbeaks (*Pheucticus melanocephalus*) were crowded around the hummingbird feeders in large numbers, as were lesser numbers of several other species.

On 14 May mist nets were set up near the feeders and one female and 27 male tanagers were captured. These were weighed, banded, and released. Four of the male tanagers were recaptured on the following day. All showed a weight reduction from the previous day (table 2). One recaptured individual, noted as weak on 14 May, appeared to be even more so on the following day (wt. 23.1 g) and probably did not survive. Another recaptured male died in my hands. His weight (23.6 g) was 6.1 g below the mean weight of the 27 males captured on the previous day and 2.4 g below the lightest male not recaptured. Only three of the 23 male tanagers not recaptured were lighter than the heaviest individual recaptured. It appears that the tanagers remaining near the feeders were those approaching starvation.

At 09:40 on 15 May, while I was attending the nets, I observed a Flammulated Owl (*Otus flammeolus*) perched in an oak near the feeders. I approached the owl, which flew only about 20 meters before it dropped to the ground, apparently exhausted. At capture, this bird, a female, weighed 39.8 g, less than either of two starved individuals reported by Johnson (Condor 67:93–124, 1965). It died the following day in spite of my efforts to feed it. A few days earlier Charles Sisler, then of the research station, chased and captured a male Wilson's Warbler (*Wilsonia pusilla*) that was capable of flight, but presumably was weakened by hunger.

These three species (Flammulated Owl, Wilson's Warbler, Western Tanager) are primarily insectivorous, feeding on active insects. The eight other species for which one or more weights were obtained are also insectivorous in part, but they are able to forage either under bark or leaf litter where their insect prey was probably less affected by the freeze. There was no indication that these species had suffered severe food deprivation.

I wish to thank Vincent D. Roth, Director of the Southwestern Research Station, for the use of equipment, and my wife Anne for aid in weighing the captured birds. The data on temperatures were compiled while I was conducting a study supported in part by the National Science Foundation Training Program in Systematics and Evolutionary Biology (GB-3366), through the University of Michigan Museum of Zoology. (Present address: Department of Biology, University of New Mexico, Albuquerque, New Mexico 87106.)

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THE SURVIVAL RATE OF JUVENILE CACTUS WRENS

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Relatively little is known about survival rates of young birds from the time they leave the nest until they are independent of parental care. Several authors have speculated that this is a period of greatly increased and perhaps even maximum mortality. It would seem reasonable to assume that inexperienced and only partially matured birds are extremely vulnerable to predators and the vagaries of climate which might lead to starvation. However, it may also be postulated that nestlings should not fledge until they are sufficiently developed that their survival rates out of the rest are equal to or higher than as nestlings. To whatever extent experience out of the nest contributes to survival out of the nest, one would expect a comparable increase in mortality immediately following fledging. This is to say that the young must "pay" for a period of gaining experience by increased mortality rates.

It is important that data on the survival of fledglings are gathered to enhance our understanding of the development of survival capabilities in birds and their relation to population phenomena.

While making a study of growth and temperature regulation in the Cactus Wren (*Campylorhynchus brunneicapillus*) near Tucson, Arizona, I was able to collect some incidental data on the survival of young.

TABLE 1. Survival of juvenile Cactus Wrens.

Nest	Number of young fledged	Interval before collection (days)	Number of young alive	Number of young lost
X	3	3	2	1
E'	3	3	3	
FF	2	6	1	1
S	3	15	2	1
Q	2	15	2	
E	4	20	4	
DD	3	21	3	
N	2	25	2	
Z	2	26	2	
I	3	26	2	1
BB	3	27	3	
B	3	29	3	
A	4	38	3	1
D	2	40	2	
Total	39	(ave. 21)	34	5

The Cactus Wren is well suited for this type of study because the young remain in family groups for several months and sleep in readily accessible roosting nests. Fourteen broods of juvenile Cactus Wrens were collected at night from roosting nests 3 to 40 days after fledging (23–60 days of age). The number of young surviving in each brood is presented in table 1. Brood size in this species is normally three or four, but many young were collected as nestlings, and thus family groups in this sample were smaller than usual. Of 39 young which fledged, 5 were not