

BARN OWL, GROWTH AND BEHAVIORISMS

BY GAYLE PICKWELL

Plate 11

THE first Barn Owl (*Tyto alba pratincola*) the author ever saw was one that was shot by a neighbor in eastern Nebraska, and the author at the time, at the height of his taxidermy urge, was asked to mount it. He did mount it and for many years it was maintained proudly on its pedestal in the living room of the neighbor.

In central California in the region of San Jose the author was later to learn that Barn Owls are common. At night in all California cities the peculiar scream of the Barn Owl, as it flies here and there after nightfall from its daytime retreat, is one of the most frequent and certainly most eerie of night sounds. This sound has been heard in most large cities of the Far West.

The species nests in many localities. A significant crevice, even in a dirt bank made by the construction of highways, often suffices. In the region of San Jose, California, the bird frequently uses cavities in the immense live oaks (*Quercus agrifolia*). Two such nests have been recorded. Others have been reported in lofts of barns. One of the most surprising was a nest made in an inexplicable cavity on the side of a large stack of hay about nine miles from Los Banos in the San Joaquin Valley. This nest was discovered on May 29, 1929. On San Jose State College campus, these owls nested habitually in the casements below the windows of a high campus tower, and janitors told the author that these casements had been used as nest sites for many years.

As later records will show, the Barn Owl is one of the most effective catchers of pocket gophers (*Thomomys*). Its method of hunting is described in my notes made on April 30, 1931: ". . . Two or three Barn Owls were seen hunting over the hay meadows in the region of Evergreen in the dusk. They flew back and forth, 'stood' about 30-40 feet in the air—and dropped precipitously."

The parent owl often persists in sitting near her young and will not leave them, even when disturbed. Such a record was made on April 30, 1931, at Evergreen California, and much later (May 6, 1939) a parent owl allowed herself to be photographed in rampant pose with her six young in a south casement of the college tower. On May 16 it was noted that, of the several young in this nest, the largest was fully twice the size of the smallest. This observation was made also of the young of the nest which was critically followed.

One of the nests of the college tower was followed carefully in 1928 throughout the full life history of the resultant young. The nest in the westernmost of these casements (a casement which measured 28" by 8' inside, with a depth of 3' 8") had seven eggs on February 25. These were of the usual owl-egg coloring—dead white—and strikingly oval in shape. One of the seven eggs hatched on March 12. The following record was made at the time:

" . . . One owl hatched, egg shells by side of nest, six eggs yet Young very weak and helpless. Could not raise head. Said 'peep' however. Female (?) went off reluctantly—alighted on box and then away to same tree west. Two photos of nest. While at work, owl came in, alighted on side of building, and away again. No notes."

Another young did not hatch until March 19, seven days later; and on March 21 a third hatched. On March 22, the fourth egg was pipped and the young was squeaking inside, and on March 23 this fourth hatched. Since these young owls were weighed carefully every day, it was learned that this fourth chick at hatching was appreciably less in weight than the egg from which it emerged. The egg had weighed 21.7 grams and the young owl weighed 17.9 grams. Since this newly hatched young had had no opportunity to eat, this lessening could be easily explained by the loss of the weight of the egg shell and the drying that accompanies hatching.

On March 24, the following day, another egg with a young owl peeping inside weighed 21.8 grams. This egg hatched on March 25; the chick weighed 21.2 grams. This newly hatched bird squeaked as loudly as those hatched earlier.

On March 27 the records state the following with regard to the sixth owl: " . . . Weight 18.5 grams. This one could not be measured for it was just out of the shell and had not straightened out as yet."

The seventh Barn Owl egg apparently was addled, for it produced no young.

The six young owls had been hatched over a period of 15 days. The intervals between hatchings had been irregular—seven days between the first and second and at two-day intervals for the remainder. This irregularity in the hatching of the young Barn Owls indicated that the parent had begun to incubate perhaps as soon as the first egg had been laid and continued to sit and lay eggs for some time thereafter. This not only caused a striking differential in the ages of the young but also resulted in striking differences in their sizes (*see* Table 1).

The egg tooth on the bill of the first Barn Owl persisted for several



(Upper) PARENT BARN OWL IN PROTECTIVE POSE ABOVE THE YOUNG. (Lower) PARENT WITH POCKET GOPHER, AND YOUNG OWLS NOS. 1 AND 2 (SEE TEXT).

TABLE 1
WEIGHTS AND LENGTHS OF YOUNG BARN OWLS AND WEIGHTS OF EGGS
FROM MARCH 20, 1928 TO APRIL 3, 1928

Date	Weight (grams)							Length (millimeters)						
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
March 20	101.5	41.0	N. R.	23.0	N. R.	22.0	N. R.	155	112	N. R.	N. R.	N. R.	N. R.	N. R.
21	127.0	54.0	22.0	23.0	21.0	22.0	21.9	160	115	88	N. R.	N. R.	N. R.	N. R.
22	135.0	66.0	26.5	23.0	21.0	22.0	21.7	169	131	92	N. R.	N. R.	N. R.	N. R.
23	149.0	79.4	31.2	23.2	21.1	22.0	17.9	172	130	97	N. R.	N. R.	N. R.	85
24	170.5	104.5	42.3	eggs	muddy		20.0	181	140	117	N. R.	N. R.	N. R.	87
25	191.9	114.2	51.5	eggs	muddy		23.7	190	150	115	N. R.	N. R.	N. R.	91
26	231.0	139.1	62.4	addled	20.0	22.3	30.0	195	160	125	addled	85	N. R.	97
27	231.2	147.2	70.8	egg	19.4	18.5	31.0	201	160	126	egg	lost	N. R.	100
28	244.6 ¹	169.2	68.7	lost	lost	lost	lost	210	165	125	lost	lost	N. R.	lost
29	255.0	171.0	67.7					215	175	135			N. R.	
30	312.0	200.0	92.0					218	190	140			N. R.	
31	329.7	222.6	111.2					233	195	144			N. R.	
April 1	364.1	238.2	133.0					240	200	154			N. R.	
2	348.4	N. R.	145.7					230	205	163			N. R.	
3	365.0	260.0	Dead, about half eaten					242	205	Dead, about half eaten			N. R.	

N. R. = No record.

¹ After swallowing gopher, 277.3 grams.

Weights of eggs are in italics

days. It was still in evidence on March 25, 13 days after the young had hatched.

From the beginning, the parent owls placed dead pocket gophers (*Thomomys*) in the nest beside the young. This behavior persisted for many weeks. In the end of the casement where the seven eggs had been placed there was no nesting material of any sort, but the pellets of the adults and the young made there a rather extensive mat of fur of this mammal.

To the confessed chagrin of the author, pellets of the owls were not collected daily until April 29, but from this date until May 24 they were carefully collected and their contents examined. That examination gave the following results, showing the food that the young were fed, as well as that which may have been regurgitated by the parents. From April 29 to May 24: 43 pellets—36 pocket gophers (*Thomomys*), 16 meadow mice (*Microtus*), and one mole (*Scapanus*).

On March 28, three of the six young were not present in the casement. It was impossible for them to have gotten out, and so it was presumed that the persistent rain during the latter part of March, attended by cold weather, had reduced these infant owls to hapless, inert masses. There was no indication as to their fate, whether they had been eaten by the older nestlings or by the parents. Certain it is that they disappeared utterly. My notes, made on March 28, show some of the speculations concerning their fate:

"The cold wet weather may have contributed to the early demise of the three young; undoubtedly they were eaten by the other young or old, possibly after they became stiff from chilling while the parent hunted. The weight of the remaining young today scarcely indicates that they ate these young, or all of them." (See Table 1.) Such increase in weight as Nos. 1 and 2 displayed could have been caused by eating additional pocket gophers, and since No. 3 definitely decreased in weight, it was eliminated as a suspect.

On March 28 nestling No. 1, the largest of the nestling owls, gave an amazing exhibition by seizing one of the three pocket gophers, which were lying on the floor of the casement, and swallowing it. My records of this observation made at the time are given here:

"After weighing, No. 1 was replaced in the casement, and it seized head first one of the three gophers lying by the nest and succeeded in swallowing it *entire* after a struggle that lasted at least five minutes, possibly more. The nestling stretched its mouth about the gopher, and for a time made swallowing maneuvers while the gopher was on the floor of the casement; when the gopher was approximately half down, it was lifted up. The nestling, attempting to swallow, would

make desperate swallowing efforts for a moment, lifting the wings and flopping them with each hard, noisy gulp; then it rested for a moment before the next trial. When the gopher was down the rodent—too long by far to get into the stomach—bulged out the neck like an immense goiter. If we had not seen it done, we would have been positive that no bird could swallow one-seventh of its weight at one mouthful. Another gopher weighed 50.9 grams. Three gophers were by the nest; one was swallowed." The weight of this largest nestling owl before swallowing the gopher had been 244.6 grams; after the meal its weight was 277.3 grams.

Various interruptions that seemed to prevent the brooding of the young Barn Owls allowed the smallest of the remaining three to become very weak and cold. On April 3 it was dead and partially eaten. It would seem that its inert condition led the parent owls to attempt to feed it, or portions of it, to the remaining young, Nos. 1 and 2.

Up to the end of March the reactions of nestlings Nos. 1 and 2 consisted chiefly of a quavering squeal, but on March 31 an additional reaction was presented. On this date, No. 1 gave for the first time an intimidation display, directed toward the observer. My notes of this date are as follows:

" . . . No. 1 gives defense reaction, spreads out, backs off, snaps its bill; no squeaking unless abused, then becomes childish again; swings from side to side with wings adroop in defense (or intimidating pose) . . . "

On the following day these notes were made: "April 1 . . . No. 1 does not squeal under any circumstance, no hiss today; backs off, fluffs up, droops wings, no beak snapping."

The reason for the very poor vision of the young owls was strikingly apparent because the lens showed a milky color; it was not to become sharp and clear for a long period.

On April 3 the reactions of Barn Owl No. 1 were recorded as follows: "Hisses a little and bites, though not viciously. Still squeals when handled roughly. The squeal is a quaver."

On April 4, nestling No. 1 was photographed on the scales that were used for weighing. It would still allow itself to be handled while being weighed. It rested on the full length of the tarsus, a position that was maintained for a long time. On this date, apparatus was taken to the top of the tower in an attempt to photograph the adults. This experience was of striking interest. The records made at the time are given herewith:

" . . . Later (8:30-10:00 p.m.) attempt made to secure flashlights of parent birds was futile. Approached window about 8:30 p.m.

and noted parent bird alight on casement with mammal in its bill (very probably a gopher). A canvas blind, open at top, was placed between young and myself. With apparatus set up we waited thirty minutes. Suddenly a most terrifying scream broke out immediately overhead. (It seemed not over a foot away.) In the dark and quiet it was blood-curdling. This scream was repeated many times with a pause of about 30 seconds of absolute quiet between.

"Finally tiring of it, I arose and observed the parent owls standing, in the full moonlight, like graven statuettes or gargoyles, each atop one of the two columns on either face of the tower. When I moved they snapped bills viciously, arose and flew about for a moment like wraiths. A helper put an old door out to cover me, but the parent birds would not come in; apparently they did not return.

"Four and a half gophers were by the nest (one had been in the mouth of a parent also). And the smaller of the two [young] owls was induced to swallow the part gopher. Flashlights of this were unsuccessful, and we left with the young one still trying. At night the young birds hissed terrifically each time we moved; much more so than in the day. The younger squealed much and tried to hover or be hovered by the older. This older would not accept food from us. It had been fed, for its bill and face were bloody."

Another attempt was made to photograph the adult Barn Owl as it came in with food for the young. This attempt was successful as the following notes attest: "April 5, 7:15 p.m. Parents not observed when nest approached. . . Young hissed only when window opened. Both squealed some after being handled. Parent came into casement while I was measuring No. 2. Had replaced No. 1. Scream of old owls is a high-pitched, rasping *kraaack*. Have another note as they fly about: a clicking or clucking sound, like a very loud cricket, *keet, keet, keet, keet*, uttered very rapidly.

"Had flashlight apparatus set up by 8:00 p.m. Covered myself with canvas. Parent bird hit plank above my head with resounding thud, alighted again farther out on casement and after a minute's hesitation dropped down beside young. She had a large gopher in her bill. The flash blinded her. She blundered about the casement for some time. Landed on me and I put my hand on her for a moment. Finally she hit the opening and left. No note again from owls until 8:30, then a scream (young are perfectly quiet for some time after a scream) from a tower pillar. From this time to 9:15 when I left, parent birds heard screaming or clucking frequently, but they did not alight on casement. One gopher by nest at 7:00 p.m. One other brought in. I could not induce either of young to eat. No. 2 still squeals much. Both hissed when I moved."

The notes secured on April 8 had several items of interest:

"April 8, 6:25 p.m. . . Parent bird flew off nest as I approached window. . . . Monkey face [of No. 1] beginning to show up. Caused by unsheathing of feathers about upper edge and rear of disc. Can stand full length of leg now; walks on its feet instead of on tarsus as does No. 2. Walks about rather easily. . . . Old bird noted flying about and screaming. Young hiss more tonight; snap bill, bite finger (mildly), squealing now after being replaced, struggle when hung up by neck for measuring.

"Set up flash at 7:00 p.m. Parent bird landed on casement at 7:15, gave a peculiar cluck, looked about, and flew away. At 7:30 p.m. parent bird came again, stared hard into my blind for a moment and alighted by young. No food in her bill. Flash blinded her (?) as before, but she clambered up the camera's blind and was out in a moment or two. At 8:00 p.m. parent bird screamed from the pillar back of me and one is now (8:20) flying about over the campus yelling a *skree-ak*—a peculiar rasp. Young still squeal, but older is learning to click and to scream (not much like parent yet), and other tries to. They are quiet for some time after a scream from parent. No gophers or other food."

The story of the nestling owls, especially as it is related to their advanced development, was significant in the notes made on April 9: ". . . Young owls seem to be almost blind yet; lens still milky; No. 1 walks sedately now, but blunders into everything. Practically no squealing when handled tonight."

On April 10, the nestling owls were able to bite severely, and both were able to use their claws. These additional notes were made concerning the young: ". . . Very little squealing now, either when handled or when quiet in the casement. Instead the rasping *kră-ă-ă* becoming more pronounced (squeal a quavering *squēē-ēē-ēē*, high-pitched)."

A pellet was discharged by young Barn Owl No. 1 on April 11. This pellet weighed 33 grams. Shortly after the pellet was regurgitated this young owl defecated. The combination of pellet plus defecation resulted in a great lessening of weight which was 511 grams beforehand and 472 afterward. The weight of nestling No. 2 on this date was 402 grams, a difference of 70 grams between it and No. 1. On this date, too, the young owls had advanced in behavior so that they were now fighting violently. Their behavior was such that on April 12 the following notes were made: ". . . Young hiss and fight viciously with claw and beak . . . No 1 very difficult to weigh now; starts at every motion on my part . . . No. 2 is difficult to

weigh but easier than No. 1. . . . Two whole gophers by nest
sgree, skee, skee, ee, ee, skee, eee, ee, squeal of young."

On April 13, in order to reduce the young Barn Owls to a condition in which they could be handled, they were placed in a sack. A slightly different voice from that of the parents was noted on this date, also, as the record herewith shows: ". . . After about 30 minutes heard soft *kra-ak* (much like that of young, not a scream) from s. pillar. This a new note. Young immediately set up a loud squealing. This note repeated frequently and softly and while it was being uttered an owl landed on n. edge of casement." (Therefore both owls must have been in and one gave food call.)

On April 15, the record shows this advance in the case of the two young owls: ". . . No. 1 hissed and screamed while in hand first time. Scream as loud and violent as that of adult. Down on breast very heavy and long; a little shedding from neck. Can run quite rapidly. Assumes defense attitude . . . No. 2 squealed a little while being returned to nest. Cannot yet stand on toes; uses full tarsus almost exclusively. Young shed considerable down while being handled. No. 1 shows considerable coloring of adult now; tail, wing, neck, upper portions of facial disc."

On April 17, the following note was made: "Injured leg of smaller owl in some fashion (slightly); bound in it splints."

April 19: ". . . No. 2 can stand upright; splint still on leg and holding. Leg a little swollen but in use otherwise. . . ." In spite of daily handling, the young owls seemed to go forward in their psychological development, as can be seen in the following notes of the same date: ". . . No. 1 scuttled off into corner as before, where he stands and hisses . . . assumes defense or intimidating posture . . . screams in hand, hisses, spreads, and springs at one when approached. Bites very hard."

On April 21, No. 1 weighed 564 grams, but on April 22 it weighed only 548 grams. The reason for this loss of weight is not readily explainable. At the same time, however, owl No. 2 showed a material increase in weight, so that on this date it weighed more than owl No. 1, which was seven days older (*see* Table 2). On this same date, however, the facial disc on No. 1 was almost white.

The difference in weights was not maintained for on the following day they had re-established the prevailing differential. This condition made No. 1 nine grams heavier.

On April 24 the following incidental note was recorded for Barn Owl No. 1: "Down shedding rapidly from back. Jumps at one!!"

On April 25 No. 2 was again heavier than the older No. 1 by 13.5

TABLE 2
WEIGHTS AND LENGTHS OF BARN OWLS NO. 1 AND NO. 2
FROM APRIL 4, 1928 TO MAY 25, 1928

Date	Barn Owl No. 1		Barn Owl No. 2		Date	Barn Owl No. 1		Barn Owl No. 2	
	Weight (grams)	Length (mm.)	Weight (grams)	Length (mm.)		Weight (grams)	Length (mm.)	Weight (grams)	Length (mm.)
April 4	353.6	245	250.0	205	May 1	584.3	367	650.3	340
5	405.8	247	320.0	215	2	570.0	370	563.0	345
6	408.8	260	317.3	323	3	565.5	371	557.5	350
7	N. R.	N. R.	N. R.	N. R.	4	581.8	372	609.3	345
8	445.0	260	343.6	240	5	559.5	375	562.0	353
9	456.0	265	362.7	245	6	544.0	376	569.2	360
10	456.0	265	446.7	250	7	578.0	381	585.0	360
11	511.0 ¹	274	402.0	257	8	567.0	380	584.0	360
12	489.4	275	439.1	270	9	545.0	386	588.0	370
13	527.7	280	484.5	260	10	541.0	385	578.0	367
14	513.8	285	485.1	260	11	559.5	391	615.0	370
15	528.0	290	488.8	268	12	545.0	395	589.0	376
16	535.5	292	496.8	270	13	Flew as observer entered casement		576.0	380
17	581.0	300	481.5	270	14	Still absent		551.0	380
18	N. R.	N. R.	N. R.	N. R.	15	529.0	392	634.0	383
19	531.5	308	486.7	280	16	543.0	395	589.0	384
20	560.5	320	521.5	293	17	573.0	395	564.0	385
21	564.0	320	535.5	285	18	Not in casement		549.0	383
22	548.0	332	554.0	293	19	Not in casement		551.0	385
23	554.5	339	545.5	308	20	Not in casement		517.5	390
24	565.5	340	557.5	N. R.	21	Not in casement		541.0	390
25	562.5	345	576.0	320	22	Not in casement		541.0	401
26	592.3	347	562.5	325	23	Not in casement		555.0	393
27	608.0	347	562.0	325	24	Not in casement		569.0	403
28	588.5	352	554.0	326	25	Not in casement		Not in casement	
29	586.0	357	575.0	336					
30	585.0	360	568.5	335					

¹ 427 grams after disgorging pellet.

N. R. = No record.

grams. On the following day (April 26) No. 1, the older owl, was again much heavier than No. 2, to the extent of 29.8 grams.

On April 27 the following records concerning the plumage and behaviorism of the young owls were made: ". . . Down on breast of No. 1 shedding rapidly. Fights viciously, rushes at annoyer, throws self on back with claws up. Still squeals when tightly held; still a youngster thus." In spite of the fact that by April 27 both young owls were walking on their toes, they still presented large callosities on the heels of the tarsi, this because of their early activities in walking about on the full length of the tarsus.

On April 29 there were several notes of interest, especially those regarding the apparent nausea of a young owl attendant upon the regurgitation of a pellet. The notes for this date follow:

"April 29, 6:00 p.m. . . . One photo of young in casement. Both young hiss and both sway head and body from side to side. They have done this for some time. Loose pellet material of casement all collected and sacked. It is difficult now to tell what material belongs to this nesting. Too bad it wasn't done long ago.

"No. 2 just threw up a small pellet, made a peculiar creaking sound just before dropping it, afterward dropped head down and swung it back and forth as if with an uncomfortable feeling in neck. No. 2 (quite sure) just threw up second pellet. The head swinging a preliminary, no doubt. This second much larger than other. Small pellet, 7 grams, large pellet, 13 grams. Both well enclosed in mucous.

"No. 1 weighed 586 grams. . . . Screamed loudly, fought viciously except when head concealed, caught himself on his wings when dropped back into casement, now snapping bill. Only one or two small tufts of down on back; dorsal surface of wings clear; venter still heavily downed.

"No. 2 weighed 575 grams. . . . Screamed for first time while removing tape from leg. Leg is in bad way with broken bone nearly piercing one side. . . . Squealed a little when placed back in nest."

In weighing the young owls, they were at first placed in a sack and later were wrapped in a long black cloth to facilitate handling. The weight of these articles was of course subtracted from final weights of the owls. A record made on May 2 indicated that No. 1 reacted strongly to the black cloth. On May 8 the young owls displayed a striking differential reaction to cloths of different colors. On this date they struck at the black cloth and ignored the white.

The fluctuations in weight of No. 1 and No. 2 were quite striking. Though No. 1 was the older and usually weighed more than No. 2, there were several exceptional periods wherein No. 2 weighed more

than No. 1 as on May 4. No. 2 remained heavier than No. 1 for several days thereafter.

On May 12 the following record was made concerning the facial discs and behaviorisms of the young owls: ". . . Facial disc [of No.1] now extends beyond tip of bill. Facial disc almost white; that of No. 2 strangely ruddy or cinnamon . . . No. 1 squealed when held tightly; screamed when unwrapping . . . No. 2 fights and bites with tremendous violence, much more than No. 1. No sounds except slight squealing when tightly held; squeals considerably when returned to casement. Parents not observed."

On May 13, No. 1 flew for the first time. My records on this significant date are given as follows:

"7:30 p.m. . . . No gophers; two pellets. . . . Down [of No. 2] shedding rapidly from belly; few scraps on back; considerable on thighs. Facial disc extends 2 mm. beyond bill. Old owl flying about with food call, *krēē-ēēk*, *krēē-ēēk*, *krēēk*, *krēēk*, *krēēk*, *krēēk*. (Last fast.) No 2 is responding with a peculiar rasping, regular *krăăk*, *krăăk*, *krăăk*, about a second between each. This call low, not shrill. Call may be a slow *krēē-ēēk*.

"No. 1 was standing on edge of casement when we arrived, faced us, spread wings. A moment later very softly dropped to a ledge ten feet below; after a moment there turned about and flew softly and skillfully away as if an expert. Flew out of sight around the tower."

On this date, as the records prove, it had not been possible to weigh No. 1. The weight of No. 2, however, was secured. It weighed 576 grams—considerably less than on the earlier date of May 4. Though No. 1 had left on May 13, visits were continued to the tower for some time thereafter. On May 15 the following record was made, for No. 1 had returned:

"8:15 p.m. . . . Parent owls noted flying about campus prior to visiting casement. One gopher (probably brought in by owl noted). No. 2 on war path, runs, fights, screams in handling. . . Ran rapidly tonight. Screamed more than usual but was quiet while being measured. Old bird '*kreek*, *kreeked*' while measuring . . . No. 1 had a little down around base of tail, none other. Very trim—a beautiful bird. Legs evidently growing in length. . . . An assistant heard an owl in north window casement; upon investigation No. 1 found there. This casement very narrow, and No. 1 may have experienced difficulty in getting out of it. No 1 hissed when viewed and struck viciously when caught, but made no other sounds. This evidence of grown-up bird perhaps. Took it to office and banded it—then released it from office window. It went off soberly and deliberately."

Though No. 1 had been released some several hundred yards from the nest site, it had returned to the casement on May 16. On that date the following record and notes were made:

"6:45 p.m. . . . No. 1 in casement. No. 1 appeared with No. 2. Three pellets; two gophers in south end of casement . . . No. 1 . . . screamed and hissed in casement and while handling, otherwise very much as before leaving nest. When placed back on window sill jumped back to casement instead . . . No. 2 . . . no sounds—squealed when returned to casement. Parents not observed."

On May 20 No. 2 made the first effort to fly. On this date, too, this young owl (as did owl No. 1 on May 12) showed a surprising loss of weight, for it now weighed only 517.5 grams. This was a striking loss of weight in the young owls just at the time of flying. However, in the case of owl No. 2 there was a slight regain of this lost weight, for on May 22 the record shows that it weighed 541 grams. This was also its weight on May 21.

On May 22 the food call of the young owl was noted and tabulated. The record is as follows:

" . . . A moment after No. 2 returned to casement, parent screamed. No. 2 immediately set up the persistent food call: '*creep*' or '*zeep*' or '*izeep*,' very rasping, about one second interval when going at maximum. Two birds seen flying about. Heard food call of No. 1 but could not locate him in either north or south casement. Placed No. 2 on edge of casement; teetered for a moment and nearly fell off. Looked about for a time and finally jumped back into casement beside me."

Again on May 25 this striking food call was noted as given "49 times in one minute," and on May 30 the call was given "28 times in one minute."

On May 23 and 24, Barn Owl No. 2 showed an additional increase in weight. May 24 was the last time this owl was weighed. It was on this date 66 days old. On the day No. 1 flew it had been 62 days old.

On March 12, 1929, an injured adult Barn Owl was captured. The bird weighed 602 grams. This weight of an adult owl makes an interesting comparison with the weights of the two nestling Owls on the days their last weights were taken. Nestling No. 1 weighed, at the time it was last weighed (May 15), 529 grams, and No. 2 at its last weighing (May 24) weighed 569 grams. There was no way to learn whether or not the adult owl had experienced a loss in weight and partial recovery toward the end of its nestling life, as had been true of nestlings Nos. 1 and 2.

Nestling No. 1 weighed 608 grams on April 27. On every weighing subsequent to that date it gave a reading of less than 600 grams. No. 2, however, weighed 650.3 grams on May 1. This young owl had lessened in weight about 100 grams the following day, when it weighed 563 grams. On the 4th of May this owl again weighed more than 600 grams. For several days following this, No. 2 showed a marked decrease in weight, but on May 11 it again topped 600 grams. The owl then decreased in weight for several days, but again on May 15 it gave the surprising record of 634 grams. From May 15 until the last weighing of this owl on May 24, there was then a constant though somewhat erratic decrease in weight, and on the last weighing the owl recorded 569 grams.

In addition to daily weighings of the young Barn Owls from their hatching until they left the nest, measurements were made of total length, of facial disc, wing lengths, and lengths of primary feathers. In addition to the measurements there were careful records of the increase in length of nestling down, colors of this down, and shedding of the down as the contour feathers pushed it out.

The food-begging of the young owls was heard in the vicinity of the tower or the near-by palm trees for several days after they had made their initial flights, and on June 17 there was an astonishing combat observed in the air. The records made for this day follow:

"Three owls noted about tower; considerable screaming. Once or twice aerial battles occurred and pair tumbled down for many feet. Don't understand meaning unless parents driving off young. No food calls."

SUMMARY

1. A detailed study was made of a pair of Barn Owls which nested in the casement of a high college tower in San Jose, California.

2. The most frequently utilized food of this owl in this region was the western pocket gopher, *Thomomys*.

3. The scream of the Barn Owl is a rasping *skree-ak!* and as the adult Barn Owls flew about they uttered a distinct clicking sound.

4. A total of 15 days elapsed between the hatching of the first egg and the sixth egg. The seventh was never to hatch.

5. Weight of Barn Owl No. 1 at its maximum when 46 days of age on April 27 was 608 grams. This owl decreased to 529 grams on May 15. As it made its final flight from the casement on May 17 it weighed 573 grams.

6. Weight of Barn Owl No. 2 at its maximum when 43 days of age on May 1 was 650.3 grams. This owl decreased to 517.5 grams on May

20. As it made its flight from the casement on May 24 it weighed 569 grams.

7. Presuming the average hatching weight of the young Barn Owls at 20 grams, then on May 1 the weight of 650.3 grams (the greatest weight attained) of Barn Owl No. 2 would have multiplied by about thirty-two and one-half times the average hatching weight.

8. Young Barn Owl No. 2 weighed at nest-leaving 569 grams, or about twenty-eight and one-half times the average hatching weight of 20 grams.

9. On April 11, the behavior of the young owls indicated greatly increased violence in fighting the observer, and on April 13 it was necessary to place the young owls in a sack to subdue their violence in order to weigh them.

10. Barn Owl No. 1 was observed to fly from the margin of the casement on May 13, when it was 62 days old.

11. Barn Owl No. 2 was able to fly on May 20, when it was 66 days old.

12. The first voice of the young Barn Owls was a quavering squeal. This was heard for the first time from a young owl within an egg near hatching and continued in various forms for many weeks after hatching.

13. On April 8, Barn Owl No. 1 did its first screaming and clicking.

14. On April 10, the young Barn Owls were doing very little squealing, but they were calling frequently an imitation of the adult's *skree-ak*; and the squealing of the young increased after the parental food call had been heard.

15. On April 15, Barn Owl No. 1 hissed and screamed while it was in hand.

16. On May 13, Barn Owl No. 2 was heard responding to calls of adults with a peculiar, rasping *kra-ak*, uttered at intervals of one second—this obviously a food call response.

17. Food-begging by the young Barn Owls was heard in the vicinity of the tower for several days after they had departed from the casement.

18. On June 17, there were no food calls.

19. On April 15, Barn Owl No. 1 showed much of the coloring of the adult, and on April 22, the facial disc of No. 1 was almost white.

20. On April 24, No. 1 was observed to be shedding down extensively from its back, and on April 27 it was rapidly shedding the down from its breast.

21. On May 12, the facial disc of Barn Owl No. 2 was ruddy or cinnamon in color.

REFERENCE

The most complete and satisfactory reference to the Barn Owl is A. C. Bent, 'Life Histories of North American Birds of Prey (Part 2)': 140-153, 1938. The reference cites all of the significant research papers of recent years.

San Jose
California

THE SEASONS OF BIRD SONG. REVIVAL OF SONG AFTER
THE POSTNUPTIAL MOLT

BY ARETAS A. SAUNDERS

A GOOD many of our singing birds revive the song in late summer or fall, usually after the molt that closed the nesting season is over. A few species revive the song every year. Others usually do so, but are not to be heard in certain years. Still others revive the song rarely, only in one or two years, interspersed by long periods of years of silence. A number of species, as far as I can determine, have never been known to revive the song.

The data on revival in this paper are chiefly from southern Connecticut; but for revival in July and August, most of the data are from Allegany State Park, N. Y. Only in the last six years have I had full opportunity to study revival, in those months, in Connecticut.

My studies of revival are by no means as complete as those of spring singing and cessation, for two reasons. In the fall there is no period of daylight, in which an avocation may be followed, before the time that work on a vocation must begin. In the earlier years of my studies, certain allergic troubles often made field observation at that season out of the question.

There is great variation from one season to another in the extent of fall singing. Even species that sing every fall do so much more frequently in one year than another. There are also certain days on which many birds of different species sing frequently and abundantly, followed by other days in which there is very little singing or none at all.

After some study of records in relation to the information I can get about molts, I have concluded that the study of revival belongs mainly or entirely to passerine birds. There is a certain amount of singing or calling on the part of the cuckoos, the Whip-poor-will and the Flicker, but no definite evidence to show that this is revival after the molt. September singing of the Wood Pewee is, according to authorities, not after the molt but before it.