

SOME OBSERVATIONS ON THE NESTING BEHAVIOR OF THE
BALTIMORE ORIOLE (ICTERUS GALBULA)

by

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For the purpose of satisfying the requirements of the advanced ornithology course at the University of Michigan Biological Station and to gain experience in life history studies, a study was made of the nesting habits of the Baltimore Oriole (Icterus galbula). One nest was observed during the summer of 1945 from June 28 to July 15. A tower blind placed on the nest level and one and a half feet from the nest was used for most of the observations. A total of 33 hours was spent in observations, 27 from the blind and six either from upon the ground thirty feet away or in following post-nesting activities in the vicinity.

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HABITAT AND ECOLOGICAL RELATIONSHIPS

The nest was located on the grounds of the University of Michigan Biological Station on the south side of Douglas Lake in Cheboygan County, Michigan. It was in a large-toothed aspen (Populus grandidentata) five feet from the sidewalk between cabins 24 and 26 East State Street and about 50 feet from the lake on the north side. This location afforded frequent disturbances from casual passersby and playing children. The area here is rather open with scattered trees along the street, between cabins, and between the cabins and the lake -- Norway Pine (Pinus resinosa), Large-toothed Aspen (Populus grandidentata), Red Maple (Acer rubrum), Paper Birch (Betula papyrifera), Pin Cherry (Prunus pennsylvanica), Northern Red Oak (Quercus borealis), and White Pine (Pinus strobus). Most prominent plants in the ground cover were Honey Suckle (Lonicera) and Bracken (Pteris aquilina). The only animals noted in the area around the nest were the chipmunk (Tamias striatus)

lysteri) and the thirteen-lined spermophile (Citellus tridecemlineatus), Birds either nesting in the vicinity of the oriole or commonly found in the region were the flicker (Colaptes auratus), Eastern Kingbird (Tyrannus tyrannus), Crested Flycatcher (Myiarchus crinitus), Least Flycatcher (Empidonax minimus), Tree Swallow (Iridoprocne bicolor), Purple Martin (Progne subis subis), Robin (Turdus migratorius), Cedar Waxwing (Bombycilla cedrorum), Red-eyed Vireo (Vireo olivaceus), and Eastern Goldfinch (Spinus tristis tristis). Others which were occasionally heard during observations in the blind were the Spotted Sandpiper (Actitis macularia), Black-capped Chickadee (^{Parus}~~Penthestes~~ atricapillus), House Wren (Troglodytes aedon), Purple Finch (Carpodacus purpureus purpureus), and Chordeiles minor, the Nighthawk. Many authors report that the Baltimore Oriole almost always nests near the habitations of man -- in orchards and along shaded streets of cities and towns -- and very rarely in unoccupied country.

A few ecological relations of the oriole were noted during the study. The aspen was used as shade for the nest as well as for a nesting site, while the nest was composed almost entirely of finely shredded plant fibers. The trees in the vicinity no doubt served to supply the insect food which was fed to the young, although only once was the bird seen gathering food (from the leaves of a Pin Cherry bush). Bendire and Brevet (1895:486) report that the young are fed entirely on insects and the present study confirms this. Most frequently noticed article being fed the young were large whitish spiders. Of the food of the adult, Beal (1904:28) states that caterpillars constituted the largest item, forming 34% of the food in the 202 stomachs examined. Beetles, ants, wasps, plant lice and scale insects were also found, while plant materials totalled only a little more than 16% of the whole. Almost all of the food is taken from trees, the bird practically never feeding on the ground.

The Baltimore Oriole has been reported (Bendire and Brevet, 1895:485) as a bird exhibiting little interspecific strife, allowing other birds to

come into the same tree, and even to the same limb to nest. Only one instance of the pursuit of another bird was noted in this study when the male chased a Cedar Waxwing some 100 yards or more down the road. After the young had left the nest the female was seen to assume the singing perch of an Eastern Kingbird without, however, any particularly belligerent behavior. The orioles seemingly paid no attention to any of the birds in the nest vicinity, even/a^{to} kingbird whose perch was in a tree only 10 feet away. A few examples of belligerent behavior are given in the literature (Whedon, 1938:288, 290; Nauman, 1927:446; Forbush, 1927:446-448), but these seem to be the exception rather than the rule.

Both the male and female were extremely belligerent towards any human interference with the nest, especially at the time when the nestlings were about to leave. Both birds, but most frequently the male, repeated a buzzy, chattering series of notes from high perches around the nest and sometimes dived down within a few feet of the molestor when examining the nest. The birds sometimes buzzed at passersby on the sidewalk below, but did not always do so.

No intraspecific relations were noted in the Baltimore Orioles. There were two other pairs seen in the Station area besides the one studied, one nesting just east of A Street and the other being seen in the woods a half mile from the center of camp. Allen (1928:216) describes the males as defending their territory from other orioles at the beginning of the breeding season. Some hint is given as to the size of territory by Nauman (1930:296) who states that along an elm lined suburban street in Wisconsin the Orioles averaged one nesting pair per block.

NEST

The nest was located high up in a Large-toothed Aspen (Populus grandidentata), 21 feet from the ground and about six feet from the top of the tree. It was suspended from a fork of the tree about 13 inches out on a

small side branch. Such a location, high in a tree and out on a rather drooping branch, seems to be typical of the species. (Bendire and Brevet, 1895:485 give the usual height as 8 to 50 feet or more; Forbush, 1927:443 as 9 to 90; Chapman, 1912:365 as 20 to 40.) The choice of a nesting tree, however, varies with the locality. Elms or soft maples are usually preferred when present, probably because of their size and long branches (Nauman, 1930:296; Jaques, 1928:305), but other trees such as oak, birch, sycamore, walnut, willow, and apple are commonly used (various authors). The nest was well shaded by leaves from above. This, too, seems typical of the species (Bendire and Brevet, 1895:485, etc.).

Material used in the nest was almost entirely finely shredded, grayish plant fibers. It was lined with extremely fine fibers and a very small quantity of fine hair. As reported by various authors (Roberts, 1932:311; Burns, 1924:196) this is the typical type of nest. Many birds, however, nesting in the vicinity of man, use varying amounts of string, yarn, scraps of cloth, and a considerable quantity of horse hair. A number of experiments have been carried out (described by Forbush, 1927:445) in which different colors of yarn were made available. Gray and white were taken almost exclusive of the brighter hues. Forbush (1927:445-446) reported that a male oriole included a silver buckle tied to a brilliant ribbon in the nest.

Construction of the nest was not observed, as it contained eggs almost ready to hatch when first found. As mentioned above, it was suspended by its rim between the two sides of a fork on a small horizontal branch. Anchoring strands were thrown over the two twigs and very firmly woven into the nest. A twig from the branch above was woven into the side of the nest so that the tips of its leaves protruded. The sides of the nest were rather thin, but thickly enough woven so that they could not be seen through, while the bottom was thicker -- perhaps three quarters of an inch thick. Exact

measurements were not taken. Bendire and Brevet (1895:485) give the measurements of several nests which indicate that there is considerable variation in dimensions. The completely pensile type of nest seems usual, but different ^{types} variations have been noted. Sutton (1934:124-125) reported two orioles' nests inextricably woven together and suspended between two upright forks, more in the manner of the Orchard Oriole (Icterus spurius). Burns (1924:196) states that some nests may be attached to twigs extending down the sides, with the rim partly or wholly unsupported. Forbush (1927:443) remarks that the nest is usually open above, but that occasionally it may be roofed over, with the entrance hole on one side.

Most writers agree that the female does all of the building, working from the inside after the first rough skeleton is completed, while the male only occasionally brings material (Roberts, 1932:311). Bendire and Brevet (1895:484), however, state that "both sexes assist in nest building." The time taken in construction evidently varies with the availability of nesting material and with the skill of the individual female. Some authors believe that it is about one week (Burns, 1924:196; Allen, 1928:216), but Nauman (1930:295) states that it requires about two to three days, while Forbush (1927:446) gives two to six days as the time required for completion of the external part. The nest building is usually started immediately after arrival in the spring -- the last two weeks in April to the first two in May at Lansing, Michigan (Barrows, 1912:450). The nest studied, then, was probably either a renesting or one delayed for some reason. The Baltimore Oriole is said never to nest a second time.

EGGS.

There were four oriole eggs and one Cowbird egg in the nest when discovered. The former were a rather dull whitish with a few small darker splotches and lines. Measurements were not taken, but Barrows (1912:451)

gives the average as .91 by .61 inches. He reports the average clutch as being four, but often five and rarely six. These numbers are generally confirmed in the literature.

NESTING EVENTS

A summary of the sequence of events at the nest will be worthwhile before considering them in more detail:

- June 27. Casual observations from the blind.
- June 28. The first day of detailed observations. The Cowbird hatched.
- June 29. Day 0 — two orioles hatched.
- June 30. Day 1. The other two orioles probably hatched.
- July 3. Day 4. One oriole nestling disappeared from the nest.
- July 6. Day 7. All the birds were banded in the morning. The Cowbird climbed out and was left on the ground. In the afternoon one oriole fell out and was replaced. The Cowbird was disposed of.
- July 9. Day 10. The nest fell apart from the strains of wind and weight and was sewed together and a sock added on the outside. One nestling which had fallen out was replaced.
- July 11. Day 12. The first nestling left the nest. One young bird died but was not removed, ~~from the nest~~. Post-nesting observations began.
- July 12. Day 13. The second nestling left the nest.
- July 14 and 15. Lost track of the birds.

INCUBATION

No information was gotten during the incubation period as the nest was discovered too late. It is generally believed that the female does almost all, if not all, of the incubating and that it lasts about 14 days. (Bendire and Brevet, 1895:485; Forbush, 1927:446, etc.)

PARENTAL CARE OF THE YOUNG:

ATTENTIVE AND INATTENTIVE PERIODS

The observations upon attentiveness and inattentiveness are summarized in Table 1 (male) and Table 2 (female). Attentiveness is defined as the time when the bird's feet are on the nest; inattentiveness as the time when the bird is not on the nest.

Table 1. Activities of the male during period of nesting care.

Date	nestlings		time	total hours & minutes	Temp. ° F. Beg. End	Wind Velocity M.P.H.	Weather conditions	Attentive Periods				num. of feeding visits per hour	Inattentive Periods					
	age	num.						num.	Estimates	Avg. L.	% total time		num.	Estimates	Avg. L.	% total		
6-28		1*	9:25-11:30	2 5	- -	5	Good	1		1 min.	.8	0.48						
6-28		1*	2:20-4:00	1 40		Hot	2	Good	1		10 Secs	0.6						
6-29	0	3	9:30-11:45	2 8		Humid	0-3	Good	0			0					100%	
6-30	1	5	1:58-3:15	1 20		75°-83°	0-5	Good	3	5 sec	15"	11.6 Secs	-	1.4	2	30"	17 3/4 min	-
7-1	2	5	2:00-3:14	1 14		67°-65°	5-15	Good	4	5"	15"	10.7"		2.5				
7-2	3	5	3:22-4:42	1 20		66°-71°	2-3	4 air - Good	0					0				
7-3	4	4	8:10 a.m. - 10:20	2 10		73°-74°	0-2	Exc.	11	4"	15"	5.9"	1.3%	4.6	10	2 1/2"	8.2	98.7%
7-3	4	4	7:12 p.m. - 8:29	1 12		71.5°	0-2	Good	3	5"	15"	8.3"		4.2	2	14 1/2"	13.2	
7-3	4	4	8:29 p.m. - 9:17	48		68.0	0	Good	0					0				100%
7-4	5	4	1:37-3:37	2		74°-77°	0-3	Good	5	2 sec	20"	10 sec	1.2%	2.5	4	1/2 min. 35"	20.2	98.8%
7-5	6	4	1:20-3:06	1 46		70°-75°	0-15	4 air (Shower)	6	2"	30"	8.6"		2.3	5	8 min. 19"	13.1	
7-6	7	3	2:27-3:50	1 23		83°-77°	3-5	Good	4	7 sec	12"	8.7"		2.9	3	2" 13 1/2"	8.5"	
7-7	8	2	3:35-5:35	2		73 72	12-15	Good	1			4"		0.5				
7-9	10	3	8:55-11:05	2 10		74°	2-5	4 air - Good (Shower)	8	3"	20"	7.7"	.96%	1.5	7	3" 28"	14.8	99.04
7-10	11	2	7:40-9:50	2 10		61.5-58	5-15	4 air	9	2"	8"	4.5"	.58%	4.2	8	3" 29"	14.1	99.42
7-11	12	2-1	7:38-9:10	1 32		66 68	2-5	Good	5	4"	5"	4.8"		3.3	4	9" 39"	18	
7-11	12	1	9:58-10:18	20		70	2-5	Good	2	5	5			6	2		1"	

* Cowbird

Table 2. Activities of the female during period of nesting care. †

Date	Nestings		Time	Attentive Periods				Inattentive Periods				Brooding Periods				Number of feeding per hour.
	Age	Num.		Num.	Extreme	Avg. L.	% Total	Num.	Extreme	Avg. L.	% Total	Num.	Extreme	Avg. L.	% Total	
6-28	1*		9:25-11:30	9	5 sec 16 min	5.8 min	49.1%	8	2 min	6.7 min	50.9	7	1 min 16	7.7	50.9	0.48
6-28	1*		2:20-4:00	6	5 sec 9 1/2 min	4.4 min	35.8%	5	4 1/2 min 16	9.6 min	64.2%	5	1/2 min 9 1/2	5.2	34.7	3.0
6-29	0	3	9:30-11:45	8	5 sec 2 min	10.4 min	64.2%	7	2 min 11	6.7 min	35.8%	5	8 1/2 min 21	14.4	56.2	2.6
6-30	1	5	1:58-3:15	7	1/2 min 7	2.7 min	35.4%	6	2 min 14	5.9 min	64.6%	3	1-4 1/2 min 2.5	14.3	4.5	
7-1	2	5	2:00-3:14	2	4 min 24	14	59.6%	1	19 min 19	19	40.4%	2	4-24 min 14.0	59.5	1.6	
7-2	3	5	3:22-4:42	4	45 sec 16 min	9.1 min	52.1%	3	7 min 14	11	47.9%	3	6-15 min 11.0	46.5	3.0	
7-3	4	4	8:10-10:20	15	5 sec 11 min	3.1 min	38.4%	14	1/2 min 11	5.5 min	61.6%	7	3-9 1/4 min 5.3	30.4	6.5	
7-3	4	4	8:17-8:29	5	5 sec 15	6.2 sec	0.82%	5	4 min 31	12.2 min	99.18%	0			6.9	
7-3	4	4	8:29-9:17	1	48 min plus		100%					1	48+	100%	0.0	
7-4	5	4	1:37-3:37	11	4 sec 11 min	1.8 min	18.6%	10	2 1/2 min 21 1/2	8.7 min	81.4%	2	4-10 1/2 min 7.25	13.7	4.5	
7-5	6	4	1:20-3:06	13	5 sec 15 min	1.8	26.7%	12	15 sec 20 min	5.3 min	73.3%	3	1-15 min 6.91	24.3	6.2	
7-6	7	3	2:27-3:50	8	5 sec 5 min	0.85 min	9.8%	7	1 min 23	9	90.2%	1	5-5 min 7.3	7.3	4.1	
7-7	8	3	3:35-5:35	13	5 sec 30	8.1 sec	1.5%	12	1/2 min 25	9.2 min	98.5%	0			6.5	
7-9	10	3	8:55-11:05	15	5 sec 5 min	0.62 min	7.58%	14	1/2 min 20 1/2	8.1 min	92.4%	1	2-2 min 1.6	1.6	5.5	
7-10	11	2	7:40-9:50	14	2 sec 20	8.1 sec	1.5%	13	2 min 26	9.2 min	98.5%	0			6.5	
7-11	12	2-1	7:38-9:10	10	3 sec 5	4.8	9	9	1/2 min 34	8	-	0			5.9	
7-11	12	1	9:58-10:18	0	-	-	-	-	-	-	100%	0			0	

† See table 1. for complete climatic analysis

* Cowbird

Male. The male was, in general, less attentive than the female, making fewer visits, staying a shorter time (never more than a minute at the nest), and never brooding. The percentage of the total time in which he was attentive was always less than one percent. Out of 15 observational periods he made from none to 11 visits per period (average, 3.8). Except for the fact that he came rarely for the first three days no trends were observable throughout the period of nest care either in numbers of visits or in length of visits. No correlations could be drawn between male attentiveness and time of day, weather conditions, or the activities of the female. The inattentive periods, correspondingly, show no trends or correlations. A closer analysis of the attentive periods reveals that the male did no brooding and fed practically every time he came to the nest. There was no particular trend throughout the nesting period in the number of feedings per hour, except that they were low for the first three days. They were always fewer than those of the female except on one day which was cold and windy. The male never fed the female and did not feed at night.

Female. The attentive periods of the female were more frequent than those of the male, varying from two to 15 per observational period (8.7 average). They were also longer, due primarily to the time spent brooding, the average length per observational period varying from 4.8 seconds to 14 minutes. The percentage of the total time in which the female was attentive varied from .82% to 64.2%. Correspondingly, the inattentive periods were shorter than those of the male, averaging from 5.5 to 12.2 minutes.

Correlations of attentiveness and inattentiveness with other factors were as follows: There were no correlations with the attentiveness of the male. No particular trend was observable in the number of attentive periods throughout the period of nesting care. The average length of the attentive

periods (and also therefore of the percentage of total time) is erratic during the first part of the nesting period. From the fifth day of nestling life on, however, it shows a downward trend. Correspondingly, the inattentive periods tend to be longer and the percentage of the total time inattentive rises.

A more detailed analysis of the activities of the female during the attentive periods is very interesting. She fed almost every time on arriving at the nest. The number of feeding per was low for the first three days of observation (.48 to 3.0), then becoming slightly higher, with, however, no great increase as 6.9 was the highest. Brooding followed after feeding or a short interval of standing on the edge of the nest. The number of brooding periods and the percentage of the total time spent thus decreased throughout the observations, lowering after the fourth day, dropping lower after the sixth until there was none on the last two days. The length of brooding periods was erratic and showed no definite trends. No particular correlations could be drawn with either brooding or feeding with the temperature or wind except on one day, rather early in the nestling period, which was both cold and windy. On this day the female brooded more and fed less than usual, while the male fed more than usual. The time of day also seemingly had little effect on brooding or feeding except during the one evening observation which was made. From 7:17 until 8:29^{p.m.} the female made the most feeding visits per hour ever observed and did not brood at all. The male meanwhile maintained his regular rhythm. At 8:29 p.m. the female started brooding and continued through 9:17 when I left the blind. This was the only occasion of my leaving when she did not flush from the nest. The male did not appear after his mate started brooding. A short shower occurred during one observation. The female fed more often than usual just before the shower and brooded the young for fifteen minutes until it was over.

Two other interesting activities took place during the attentive periods

-- repair of the nest and nest sanitation. The female only engaged in the former. On the first day of hatching of the young orioles she kept poking her bill through the nest from the inside, working her way counter-clockwise for approximately two-sixths of the way around the nest as she brooded the young. Only four other gestures towards nest mending were observed and these were merely a few pokes of the bill through the nest. As the nestlings grew older these attempts ceased and none were seen when, on the tenth day of nestling life, the strains of high winds and increasing weight in the nest weakened the walls and caused a large hole in the side.

Both birds took a part in the nest sanitation, cleaning the nest of mites and swallowing or removing the fecal sacs, usually directly after feeding. The female took a much more active part than the male, being observed cleaning 40 times to his seven. Through the fifth day the female ate the sacs, but from the sixth day on, with only two exceptions, she flew away with them. The male cleaned the nest twice (supposedly eating the lice and mites which were abundant) and later on flew away with fecal sacs five times.

A summarization of the trends in attentiveness and inattentiveness and the activities taking place during the former will serve to draw the foregoing discussion together. With the growth of the young: (1) There was no trend in the number of attentive periods, either of male or female. (2) There was no trend in the length of attentive periods of the male, while those of the female became shorter, due to shorter brooding periods. (3) The percent of total time spent in attentiveness remained the same in the male and grew less in the female. Certain effects of the physical environment and the time of day were noted: (1) The evening brought increased feeding and decreased brooding by the female until she settled on the nest for the night. It did not affect the male except that he did not feed after the female started brooding. (2) The temperature and wind had no observable effects except on one cold and windy day when the female brooded more and fed

less, while the male fed more than usual. (3) The female brooded the young throughout a short rain and fed more frequently before it. No correlations could be drawn between any of the activities of the male and female.

BEHAVIOR AROUND THE NEST

Certain other interesting aspects of bird behavior were noted in the vicinity of the nest during the period of nestling attendance, although study from the blind limited these observations.

The direction of coming to and leaving the nest as well as the position on the nest were noted. The female usually flew into the nest directly without perching in the tree on the way, while the male was more apt to hop to the nest by way of several branches around it. Both birds almost always came and went at about the level of the nest and usually from either right or left, rarely from the back. Both birds used the same side of the nest as a perch while feeding, almost invariably standing on the crotch from the sides of which the nest was suspended.

The general behavior of both male and female around the nest seemed very nervous, neither remaining still for more than a moment. This was especially true of the male who, with one exception never stayed on the nest more than a few seconds. Both birds were flushed from the nest at the slightest disturbance in the blind (with the exception of low talking). This extreme touchiness may have been due to the individualities of these particular birds, to the closeness of the blind, or both. Other authors do not mention it and even suggest that the oriole is quite bold. Forbush (1927:446-447) reports one case in which a female remained on the nest while the branch it was on was sawed off and taken into a house.

Other authors have noted great devotion between the pair, Bendire and Brevet stating (1895:483) that "Few birds are more devoted to each other than

these orioles, and I am of the opinion that they remain mated throughout life." Few, if any, evidences of this were noted in the present study. The male usually made a buzzing sound before coming to the nest with food, but this seemed more like a signal than anything else. On one occasion he gave a short song from a neighboring tree. The female immediately left the nest with a short answering song.

SONG

Many of the activities described above were accompanied by some sort of call notes or song. Both sexes sang, but the female did so rather infrequently. The male did not give any continuous song at any time, just whistling a series of notes which were never repeated more than three times and most often only twice. These might be interpreted as "hioh, hioh, hioh, woy, woy" or "hioh, hioh, woy, woy" (using the terminology of Bendire). They were most commonly uttered from one of several high perches in the vicinity of the nest after the male had fed. The amount of song decreased at the end of the nesting period. Occasionally the male uttered another series of whistled notes which may be interpreted as "peter, peter, peter!" Quite frequently after objecting to intrusions with the loud series of buzzes mentioned earlier, the male would sit on a high perch and give a long series (20 to 30) of clear separate whistles. The female rarely sang, but when she did it was with a song somewhat similar to the first described of the male, but with a different tone and not quite as clear cut. Besides these songs the orioles had another note, a sort of trilling buzz given with open bill and vibrating throat. This was given on two sorts of occasions -- as the alarm buzz mentioned earlier and as a signal around the nest. On coming to and/or leaving the nest the female quite often gave this buzz either at the nest or a few feet away. The male was usually silent when coming or leaving but he often gave one buzz

from the next tree just before coming in to feed. If the female was on the nest she would leave on hearing this.

There are several notes in the literature on the song of the Baltimore Oriole, but none are concerned with the different uses of different phrases. It is commonly noted that there is a great deal of variation of song pattern in the same and different birds. (Coffin, 1928:97, etc), while Roberts (1932:311) reports that the orioles may sometimes seem to imitate other birds' notes and songs, mentioning in particular a "chewink" call.

DEVELOPMENT OF THE YOUNG

Very little study was done on the development of the young due to the depth of the nest and the nervousness of the parents. A few notes on feather and voice development were taken, however, and are summarized below.

- Day 0. Hatched with a very little down and some quills along the spinal and wing tracts.
- Day 7. Juvenal feathers out of sheaths -- black on back, legs, wings; yellow underneath, around anus.
- Day 10. Olive-colored contour feathers covering the back.
- Day 1. Slight squeaky noises from the nest.
- Day 4. Very vocal. Lots of little chipping most of the time, but more when fed.
- Day 5. Chippings louder. Less noise when parents away.
- Day 10 and thereafter. Little peeps (trills) every three or four minutes, more and louder when the parents there.
- Day 11. One young came to the top of nest and flapped wings.
- Day 12. 7:45 a.m. The first nestling left the nest; went towards lake.
- Day 13. 8:52 a.m. The second nestling left the nest; went to bracken below nest.

Few observations have been made in the literature upon young orioles. Most of them merely mention the insistent calling for food, both before and after leaving the nest. Chapman (1912:365) calls them the cry-babies of the bird world. Allen (1928:216) states that they cry persistently for food for two days before leaving the nest and for a week thereafter. He states that they leave the nest in two weeks and this seems to be the common opinion

(Bendire and Brevet, 1895:485-486).

POST-NESTING STUDY

The young birds were followed for four days of post-nesting study. Observations on this period will be divided into two sections -- one on the young, the other on the parents.

The fledglings were not very skillful fliers. On leaving the nest they fluttered and flopped to the next tree. They usually remained in one place for quite a while, but each day they were found in a new location farther away from the nesting site. The first nestling to leave, one with a red band, spent the first day in trees towards the lake, some 40 feet away from the nest. On the second day he was found in the top of a high maple, about 35 to 40 feet up, by the faculty garage, and on the third day about 15 feet up in an oak tree along the shore beyond the old laboratory. He was not found after this. The second to leave, marked by a yellow band, spent his first day out on the shore opposite faculty cabin 30/ ^{4 feet up in a maple.} The second day he was about 30 feet farther down ^{about three feet up} the shore in a small maple, ~~about three feet above ground.~~ He moved from here to the ground and to the neighboring pine during the observation. He was not found again, but an adult male oriole (the male parent cared for this nestling) was heard scolding by the last faculty cabin on the next day and on the next following day a male was seen by the saw mill clearing acting as if he were feeding. No more attempts were made to find the orioles. Allen (1928:216) states that the parents continue to feed the young for two weeks after they have left the nest. As mentioned earlier, the young orioles were very noisy. This was especially true when the parents were around. Otherwise they uttered their insistent squeakings approximately every two or three minutes. The voice when they were fed was higher and faster and accompanied by a fast shaking of the wings.

Forbush (1927:443) notes a difference in the cries of the youngsters before and after leaving the nest, but this was not noticed in this study.

The behavior of the parents as the fledglings left the nest was very interesting, the female accompanying the first when it left, the male staying with the second and accompanying it away on the following day. The female returned to the nest to feed for a few times soon after the first fledgling left, but after this I never observed her with it or with the male, while the latter was never seen near his mate or the first young bird. Both parents continued to scold when the observer entered the area around the young, but were evidently not prevented from feeding in a normal manner. They also continued the low soft buss on feeding, but song ceased almost entirely. The female was not heard to sing at all, while the male uttered only the clear separate whistles. Allen (1928:216) noted that the male sings a great deal during incubation, but stops almost entirely when he starts feeding the young. In the present study he did not cease singing entirely until the fledglings had left the nest.

The feeding activities are summarized in Table 3. This table shows that both male and female fed much more frequently during the post nesting period than in that of nest care -- for the female a maximum of 16.2 per hour as contrasted with a maximum of 6.9 per hour in the earlier period, and for the male a maximum of 17.6 per hour as contrasted with 4.6. The number of attentive periods correspondingly increased, while the inattentive periods decreased greatly in length. The attentive periods were not tabulated due to the difficulty of determining the length of time attentive.

Table 3. Post-nesting activities

Nesting and Day out of nest	Date	Time	Total hrs. min.	Weather cond. time	Female				Male			
					no. feedings per Hour	Inattentive Periods			no. of feedings per Hour	Inattentive Periods		
						num.	Extreme	Av. L.		num.	Extreme	Av. L.
Yellow 1st Day	7-12	P.m. 4:08- 4:45 ¹ / ₂	37 ¹ / ₂	Fair (Cloudy, no Wind)					17.6	10	1/2 min - 8 min.	3.75 min.
Yellow 2nd Day	7-13	a.m. 8:54- 9:40	46	Good (Cloudy, Cool Wind 0-3)					10.9	9	1 1/2 min 7 "	5.1 min.
Red 2nd Day	7-12	P.m. 4:46- 5:29	33 ¹ / ₂	Fair (Some Rain Wind 0)	16.1	8	1/4 min. 13 3/4 "	4.4				
Red 3rd Day	7-13	a.m. 10:10- 10:47	37	Good (Cloudy, Cool Wind 0-3)	16.2	9	1 min - 8 1/2 "	4.1				

SUMMARY

1. A nest of the Baltimore Oriole, Icterus galbula (Linnaeus), was studied for a total of 33 hours from June 28 to July 15, 1945 at the University of Michigan Biological Station.
2. The study was made on the grounds of the Biological Station where the area is rather open with a mixture of various species of trees along the street. The trees afforded nest site, shelter, and a foraging area for food. Only insect food was seen being given the young, with large spiders the predominating item. Only one example of interspecific strife was noted, when the male oriole chased away a Cedar Waxwing. This lack of pugnacity seems customary for the species except for their beligerency towards human interference. No territorial reactions were noted.
3. The nest was located near the top of a large-toothed aspen (Populus grandidentata). It was suspended from its rim in the fork of a small side branch 21 feet from the ground. It was composed of fine shredded plant fibers, grayish in color, and lined with finer fibers and a very little hair.
4. The nest when found contained four oriole eggs and one Cowbird egg. These hatched almost immediately so that only the period of nestling care formed most of this study.
5. There was no correlation between the attentiveness of male and female. During the period of nestling care both sexes fed, but the male considerably less. Only the female brooded, the periods becoming fewer and shorter until they ceased at the end. The female brooded the young at night and during a shower, feeding more frequently before settling on the nest in both cases. Both sexes cleaned the nest and removed fecal sacs, the male again to a much lesser extent.
6. Certain notes are made of the behavior of the parents around the nest.
7. Two types of song are noted: the clear whistled song and a thr_oat,

buzzing note. The first was uttered almost entirely by the male, and was heard less frequently as the nestlings grew older, ending completely in the post-nesting period. The buzz note was used as an alarm when it was uttered loudly and often continuously. It was also used as a signal on coming to and leaving the nest, the male usually giving one low buzz at a distance before coming in, the female more frequently giving it on or close to the nest.

8. A few observations are given on the development of the voice and feather tracts of the nestlings. Only two of the four orioles lived to leave the nest. One of these left at 7:55 a.m. on the twelfth day, the other at 8:52 a.m. on the thirteenth day.

9. The young birds were followed for three and two days of post-nesting study. They remained in one location while observed, but moved considerable distances each day. They were very noisy, uttering a loud squeaking call at frequent intervals. The female accompanied the first nestling to the leave the nest, while the male accompanied the second. The two pairs were never observed together. Both parents fed much more frequently in the post-nesting period and were inattentive for shorter periods.

BIBLIOGRAPHY

- Allen, A.A.
1928 Dame Oriole's story. Bird Lore, 30:214-222.
- Barrows, Walter Bradford
1912 Michigan Bird Life. Spec. Bull. of the Dent. of Zoology and Physiology of the Mich. Agri. Coll., Mich. Agri. Coll., Lansing, Michigan.
- Beal, F.E. L.
1904 Some common birds in their relation to agriculture. Farmers' Bulletin Number 54, U.S. Dept of Agri, Government Printing Office, Washington, D.C.
- Bendire, Charles and Major Brevet, U.S.A.
1895 Life Histories of North American Birds. Smithsonian Institution, Washington, D.C.
- Burns, Frank L.
1924 The philosophy of birds' nests and comparative calology in consideration of some local nidicolus birds. Wilson Bull., 36:188-200.
- Chapman, Frank M.
1912 Handbook of Birds of Eastern North America. D. Appleton and Company, New York, N.Y.
- Coffin, Lucy V. Baxter
1928 Individuality in bird song. Wilson Bull., 40:95-99.
- Forbush, Edward H.
1927 Birds of Massachusetts and other New England States. Vol. 2. Norwood Press, Norwood, Mass.
- Jaques, H.E.
1928 A recount of the Baltimore Orioles nesting in Mount Pleasant, Iowa. Proc. Ia. Acad. Sci., 35:305-306. (Reviewed in Wilson Bull., 42:143.)
- Nauman, E.D.
1930 The nesting habits of the Baltimore Oriole. Wilson Bull., 42:295-296.
- Roberts, Thomas S.
1932 The Birds of Minnesota. Univ. of Minnesota Press, Minneapolis, Minn.
- Sutton, George Miksch
1934 A double nest of the Baltimore Oriole. Wilson Bull., 46:124-125.
- Whedon, A.D.
1938 Nesting Behavior of Kingbirds. Wilson Bull., 50:288-289.