

DAILY LIFE OF THE AMERICAN EAGLE: EARLY PHASE.

BY FRANCIS H. HERRICK.

*(Concluded)**Plates XIX-XX.**8. Eagles Breeding in Confinement.*

Forty-five years ago, in 1886 and 1887, Henry Hulse succeeded in inducing the Bald Eagle to breed in a cage, and so far as known to me, his was the first successful experiment of this kind. Since his account seems to have been completely forgotten or overlooked by all subsequent students or writers, I will give a brief resumé of his results.¹

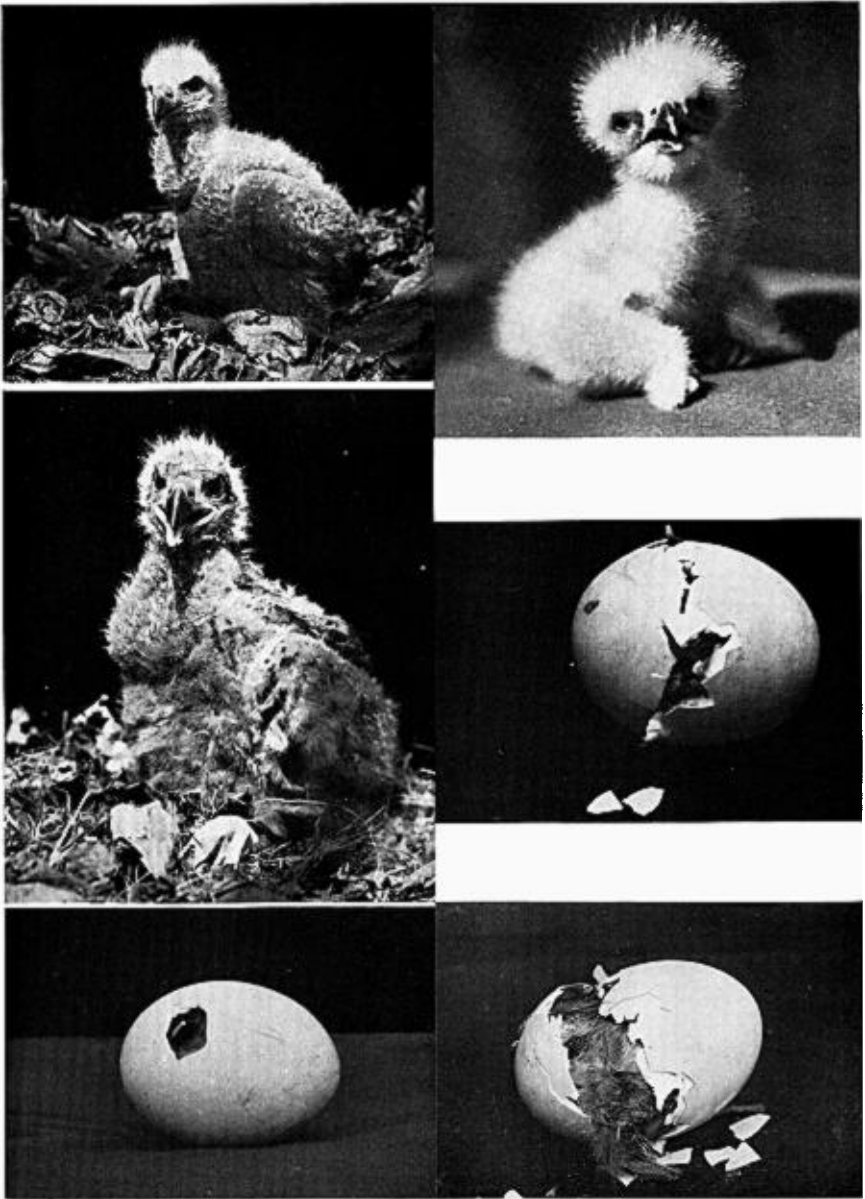
Hulse took two eagles from a nest at Eagle Point, five miles above Toledo, Ohio, about 1880, and on June 6 of that year two others from another nest, when he thought that they were about a month old, but when in reality they were probably much older. In both instances the birds proved to be male and female and all of them thrived. In the second year of captivity their dark heads began to whiten, and by the end of six years the adult plumage, marked by pure white head, neck and tail, was fully established.

For some time Mr. Hulse kept his eagles in a large cage of heavy wire, but later fitted up for them on a porch of his house a slatted enclosure, 6 by 8 feet square, and 8 feet high; and near the top he fixed a nest-box 3 feet square by 1 foot deep.

On April 6, 1885, the female of the second set, then in her sixth year of cage-life, laid a single egg, sat on it for the full time, but it failed to hatch. In the year following, on March 20, 1886, this bird had two eggs. One of these was infertile, but the other was hatched on April 23, or after incubation of thirty-five days.

Mr. Hulse said that he had handled the parent birds with impunity from the time they were first taken, but that he did not dare to enter their cage after the appearance of the eaglet. This female had a wing stretch of 7 feet, and the male of 6 feet, 8 inches.

¹ See "Eagles Breeding in Captivity," 'Forest and Stream,' vol. xxvii (designated by error vol. xxvi), p. 327. May 20, 1886, and vol. xxviii, p. 392. New York, 1887.



1 AND 2 (*left*). YOUNG EAGLE IN SECOND DOWN STAGE WITH REMNANTS OF NATAL DOWN, AND IN TRANSITION TO JUVENAL PLUMAGE.

1 (*right*) YOUNG EAGLE TWO DAYS OLD.

EGG HATCHED UNDER HEN: (*left*) PIPPED, 11 A. M.; (*right*) (1) EAGLET HAS ROTATED EXTENDING CHINK ROUND THE EGG, 3 P. M.; (2) LEFT WING OUT, 3.35 P. M., AND SHELL SEPARATED FIVE MINUTES LATER.

While the female was incubating she was fed by her mate, and she in turn fed the young bird with small bits of fresh fish.

On March 24, 1887, this same bird laid an egg and on the 25th, another, the first hatching on May 1, and the other on the day following, the time of incubation being 37 days. The female, said Mr. Hulse, kept close to the nest, while the male stood at guard farther away. When he was given a fish he would take it directly to the nest, and return for another which he would eat himself.

The success of Dr. F. A. Crandall with Bald Eagles breeding in captivity at the Buffalo Zoological Garden in 1909 and subsequently, is referred to in a brief published notice of that year.¹ In the first instance the mother bird was taken in the Georgian Bay region, Canada, in 1899, and the father was brought from Alaska in 1903, both being from two to three years old when received. If I understand Dr. Crandall's statement in a letter, these birds mated in the autumn of 1906, and four sets of eggs were laid with the following results: no young in 1907; two eaglets reared in 1909 and again in 1910, and one eaglet by a second mate in 1916. This female then died, but one female eaglet was reared from another pair of eagles obtained from Toronto, Canada. The three sets of fertile eggs, just mentioned, were hatched on April 14-18, after 31-46½ days of incubation.

The male of the last pair of eagles mentioned died in 1921, but the female, though unmated, and later her daughter, have been laying eggs every year since, as stated by Dr. Crandall, in his letter of July 16, 1931.²

9. *Eagles' Eggs hatched under Hens, and Growth of Young.*

Our first incubation experiments were made with four eggs of this Eagle obtained on April 1 from a nest in Canada.³ They were

¹ See The 'Zool. Socy. Bull.,' No. 36, pp. 582-83. New York, 1909.

² The most remarkable instance of reproductive activity in unmated birds that has come to my notice is that of two Canada Geese, on the farm of James S. Morrow, Cortland, Ohio, and now upwards of 117 years old, having been captured according to authentic documentary evidence, in Marion county by William Garbison, in October, 1814. The two geese are credited with eggs each year since their capture, and often with more than the number usual with the species. It is estimated that the two have laid more than two thousand eggs in captivity. See C. J. Colmery, 'The Youngstown Vindicator,' August 23, 1931.

³ By Professor J. Paul Visscher, to whose energetic assistance I am greatly indebted.

placed in an incubator in the Biological Laboratory of Western Reserve University, and kept at a temperature of about 102° F., considered normal for the early days of incubation in the domestic fowl, the whole period of which extends to 20–21 days. These eggs appeared to develop normally for about two weeks. All lost daily in weight, and the movements of the cheeping eaglet, when close to the hatching point, could be readily perceived. Then, on April 14 all suddenly died, and apparently at about the same time, but when they were opened a surprising degree of difference in the degree of development attained, was apparent, the oldest eaglet being apparently four days, or more, in advance of the others. The differences between the other embryos were less marked. No greater success that year was obtained with two other eggs.

Three eggs secured from the same nest on March 31, 1931,¹ were placed under hens at the Biological Laboratory, and were normally hatched in 9, 11, and 13 days from the above date. The oldest bird, coming from the first egg, was later ascertained to be a female, while one, and probably both, of the smaller birds were males, a condition precisely like that found at nest No. 5, when the three young were killed in May, 1926. Of the two young eagles which we reared in captivity in 1929 from the second down to the juvenal stages, the smaller bird, which was killed by its older nest- and cage-mate, was a male. The slightly larger and somewhat older bird, which is, I think, a female, was banded and on August 8, 1929 was given to the Zoological Garden in Brookside Park, Cleveland, where it was still living in 1932.

The history of the oldest eaglet from hatching up to about the fifth week, or as far as I was able to follow it, will now be briefly given: April 7, 7 P. M. Shell pierced by egg-tooth;

April 8, 11 A. M. Egg pipped, tip of eaglet's bill showing, and cheeping frequent and vigorous. The shell-opening was slightly enlarged to give the eaglet better access to air:

April 8, 8 P. M. Head of young eagle, bent to left side, and with the body had rotated through 160°. Small pieces of the brittle shell having been chipped off, at each remove, by the egg-tooth (see Pl. XIX), and a wide chink, thus made, extended around one end of the egg. About once in five minutes the struggles of the im-

¹ By Dr. S. C. Kendeigh, of Western Reserve University.

prisoned young bird were renewed, and these movements alternated with cheepings which became more vigorous with each relapse of pressure from within.

April 8, 3 P. M. Left wing of the eaglet out, and the bird's struggles becoming more effective, the chink was widened to one inch. (Pl. XIX, lower right.)

April 8, 3:40 P. M. This eaglet, eighteen hours after its egg-tooth had pierced the shell, and when its two unequal divisions separated and fell apart, hatched in my hand.

The eaglet's eyes remained closed for four hours after its emergence, and the umbilicus, open at birth, soon closed up. The down on the left wing, because it was longest exposed to the air, alone was fluffed out, that is, upon drying off the barbs of each feather had separated. The down feathers over the rest of the body, still wet with the amniotic liquid, showed light, streaked with very dark feathers. These 'black' down feathers, on the hinder parts of the body, on drying became a smoky gray. (See Pl. XX) The remains of the allantois in the cast off shell were inconspicuous, but there was the usual whitish mass of excretory matter in the larger division.

The eaglet is transformed, upon drying, into a downy 'chick,' of characteristic appearance. (Pl. XIX, upper right.) Its eyes and bill are dark, but—the core, however, is light gray and is separated from the mandible by a distinct fold.—Eyes and bill are thus in strong contrast to the light gray down, which becomes darker in the hinder parts of the body and pure white only on the chin, upper neck, and under parts particularly about the umbilicus. The down is of two kinds, a thick under coat, each feather of which is provided with closely set barbs, and an outer, thinner layer of much longer 'hairs' or filo-plumes. The flattened appearance of the eaglet's head at this early stage (see Pl. XX) is due to the distribution of the down and disappears in about a week. The eaglet's shanks, mostly naked in the juvenal and adult states, are thickly covered with down, excepting on their under sides, and remain so through the down stages. To my surprise the small egg-tooth persisted for over a month or until it was worn away or rubbed off.

The eaglet sat up as soon as it was dry, and using its wings to steady it, cheeped with energy as it crawled about on 'all fours,'

resting on its shanks. When a day old it took eagerly the bits of fresh fish offered, and would peck at a finger or at the other eaglets as soon as they approached as competitors for the food.

The second egg hatched on the morning of April 10, thirty hours after its shell had been punctured, and the eaglet, later found to be a male, was smaller than its feminine predecessor. At 9 A. M., April 12, the third egg, determined also, I think, as a male, was pipped, and hatched during the night, and this bird, lighter in color than the others, as well as somewhat smaller, was very active. It would peck at the others, when food was served, and with so much vim as to tumble over when not landing a blow. This brings up the question of the well known pugnacity among the young of the eagle, which will be considered at the close of this section.

Naturally there is no sharp division between the three plumages that are passed during the ten to thirteen weeks in the eyrie, and the transitional periods are apt to be long. The first, or natal down stage lasts from two and one-half, to three weeks, but when the largest eaglet was two weeks old, and had increased in weight three times (85-250 g.) the second down-plumage, which is a shade darker and much thicker than the first, was coming in all over the body. The exposed down was all of the natal kind, but when this was separated, darker flecks of the thick, on-coming coat could be seen at the roots of all the feathers. At three weeks the eaglet was well along in transition to the second down-coat, individual feathers of which projected barely one-half inch from their follicles.

At four weeks the young eagle had increased its original weight eleven times (from 85 to 959 g.), and was a dark, Quaker gray, but head and neck still carried considerable natal down, and this over the rest of the body appeared only as small regularly distributed flecks. At five weeks this young eagle weighed 1998 grams (4 pounds, 5 ounces), and still moved about on its shanks, but could rise to its toes and take a few tottering steps. As at earlier stages, it could squeal with great persistence, and this shrill whining, when the bird was hungry, could rise to nearly the pitch of an adult eagle's scream.

At six to seven weeks this young eagle was in full transition to the juvenal dress, the gray down being sprinkled everywhere with dark brown feathers. When this stage was reached, while we were



YOUNG EAGLE WHEN CLOSE TO HATCHING POINT. *Upper*: BEFORE, AND
lower: AFTER, REMOVAL FROM THE SHELL.

working in the field, we sometimes had one gray and one almost black bird for several days in the nest, in accordance with the difference of age of the nest-mates. At this time the tail-quills had burst at their tips, and the steel-gray feather-tubes of the primaries and secondaries showed from two to three inches of the definitive juvenal feathers.

10. *Contentions among the Eaglets.*

In the seven seasons, during which I have made more or less detailed observations at Vermillion, 16 young eagles have been hatched,—twice with three, and five times with two in the nest. How many were eventually reared I cannot say since my late records for three of these years are incomplete, but only one bird has died as a result of disagreements in the nest. It is perhaps doubtful if more than two eaglets are commonly reared, but the three eaglets hatched in 1926, lived in amity for six to seven weeks, or until all perished in consequence of a storm. At the time of their deaths their respective weights were 8, $6\frac{1}{8}$ and 6 pounds, with wing-stretch of 43.5, 39 and 34 inches, the largest being a female, and the two smaller, males. When a lone eaglet is found in a nest in late June or July, it is seldom possible to know whether it had other nest-mates earlier in the season.

Seton Gordon¹ speaks of a stalker who had spent his life in the eagle country of northern Scotland, and had kept careful records of his experience, telling of eighty-two eyries that he had personally known; in eight there had been 3 eggs each; fifteen had held but 1 egg, while fifty-nine, or all the others, contained but 2. He had heard of a nest with 4 eggs, but these were "rather below the normal size," and the Duke of Argyll reported a case of a pair of Golden Eagles that had reared three young. This was thought to have been exceptional, but the statement that "in all the eight clutches of three eggs mentioned above, never more than two eaglets were hatched," is, I believe, erroneous. A considerable loss of eggs may arise through infertility, but the real rub comes in rearing the young.

That the young of the Golden Eagle contend with one another in the nest is evidenced by the fact that an eaglet sometimes disap-

¹ See "Days with the Golden Eagle," p. 55. London, 1927.

pears from the eyrie and is found dead on the rocks below it. Gordon quotes a stalker who once found both of the young eagles dead under the eyrie, and this was thought to have been the outcome of an exceptionally persistent and evenly matched battle.

There is no doubt that the first two or three weeks after the hatching of the first egg are most critical for any eaglets that follow: and the longer the interval between the laying of the first and second eggs, the more acute does this crisis become. If this unfortunate condition is being gradually eliminated through natural selection, the process has made little progress in the Screaming Eagle, in which Siewert found the interval in the one case studied to be ten days; and, although two eggs are commonly laid in this species, but one instance has been recorded in which more than one eaglet had been reared. The reasons for this are twofold: in the first six days of life, according to Siewert's estimates, there is a greater increase in weight than in any later similar period; and again, the older nestling, because of its greater vigor, holds up most of the food and at the same time pecks and otherwise mistreats its weaker brother.

This may not be the whole story, but a similar course of events does sometimes occur in the Bald Eagle, as happened at Vermilion in the spring of 1928. Two eaglets were hatched in that season on about April 24 and 28, and the younger bird was handicapped not only on account of its lesser age, but from the tempestuous weather and the shower of abuse it daily received from its older companion. The mother eagle constantly disregarded the needs of its puny infant, but bestowed every attention on her more vociferous offspring. Thus, on May 18, when the eagle brought in a large fish, the older nestling got 76 pieces, but the younger only 2, and a bad drubbing from his nest-mate in the bargain. On the following day rain and hail beat so relentlessly on the great nest that this much abused eaglet, then hardly able to crawl beneath the sheltering wings of its mother, finally succumbed and was trampled into the great mass of withered grass that lined its bed. It should be noticed that this harsh treatment of the younger bird had often occurred when the parent was away and when there was no contest over the food.

That young eagles, when in juvenal plumage, sometimes fight

to a finish in a state of nature, as two have been known to do when held captive in the same cage, as already related, may be true, but I have never known an instance of it. The finding of a part of the skeleton of a juvenal, however, in the ruins of the Great Vermilion Nest might possibly have resulted from such a conflict.

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