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Breeding the Bald eagle
Haliaeetus leucocephalus
at the National Zoological Park, Washington

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During the summer of 1972 the large birds of prey aviary at the National Zoo had to be emptied for renovation, so providing us with an ideal opportunity to try to breed our three Bald eagles *Haliaeetus leucocephalus*. The aviary consists of an arched frame of structural steel, 27·4 × 13·7 × 15·2 m high at its peak, covered with 5·2 × 7·6 cm 9 gauge weldmesh. It is built against and extends above a steep hillside. Inside, the slope provides the base for a massive, irregularly shaped artificial rock cliff running the length of the aviary and leaving a flat area some 4·5 m wide along the bottom frontage. The flat has an oval concrete pool about 3·3 × 4·0 m below an artificial stream. A *Mimosa pudica* grows beside the pool, which is surrounded by grasses, sedges and forbs. Above the 8 m high cliff, the full expanse of the cage is available for flight.

A nesting platform, 2 × 1·2 m, was created by installing a deck of wooden boards resting on a timber frame secured in a rear corner at a level about 2 m above the clifftop and 1 m below the arch of the cage roof. A log, 25 cm in diameter, was fixed diagonally across the exposed corner of the platform.

Two of the eagles came from Calgary Zoo in October 1967 and the third from Blackwater National Wildlife Refuge, Cambridge, Maryland, in November 1967. They were later found to be one ♂ and two ♀♀. In September 1972 the three birds were returned as sole occupants of the newly renovated aviary, and almost immediately one of the ♀♀ began to suffer harassment from the other two birds. By January 1973 the dominant pair had started to carry sticks to the platform; we had strewn variously sized sticks suitable for nesting about the flat.

On 6 February, the odd ♀ (from Calgary) was removed and given to the US Bureau of Sports Fisheries and Wildlife Endangered Species Research Center at Patuxent, Maryland. Within a week the pair had resumed courtship and nest building. Both birds carried nesting material to the platform, but it was the ♂ who did most of the carrying while the ♀ arranged the sticks in the nest. They also pulled tufts or clumps of grass from the ground in their talons to use as lining. During construction the pair began to exhibit defensive behaviour. By the time it was completed – in the first week of February – the ♀ was spending most of the day on the nest.

The first egg appeared on 21 February but was gone next day, presumably broken and eaten. A second egg, laid on 25 February, was incubated by both parents until 6 March, when it too was found missing. Thus ended the first nesting cycle. We had noted that the ♀ incubated about 80% of the time and always during the period from dusk till dawn. We observed also that the ♂ behaved awkwardly, as if he lacked incubating experience, and this prompted us to speculate that he might have broken the eggs by his clumsiness.

For the next two weeks the birds showed no interest in the nest. Then on 9 March the ♀ was seen arranging sticks and grass on the platform once more. Until that time the eagles' diet had consisted of laboratory rats, sea trout *Cynoscion regalis* and Zu/Preem Bird of Prey Diet. Following the suggestion of the new Curator, who assumed office on 12 March, it was decided that all food should be sprinkled with oyster shell flour and Vionate, a multivitamin supplement, and this procedure was followed thereafter.

On 11 April a third egg was laid. Incubation began at once, again with the ♀ assuming some 80% of it. The ♂ spent most of his time on guard duty, on a perch level with the nest in the opposite rear corner of the aviary. Black vultures *Coragyps atratus* from a roost in the park occasionally alight on top of the aviary and when this happened the ♂ would immediately charge and drive them away. After 45 days' incubation, on 26 May, the chick hatched. The parents were solicitous in guarding it, watching every person who moved by or towards the aviary, threatening anyone who stared at them, sometimes with vocalizations. The senior author, who had removed the odd ♀, was always watched with extra care, as if he presented a particular threat.

The chick was coloured smoke grey on the upper parts and slightly paler on the head and underparts, exactly as described by Brown & Amadon (*1*). Chin and throat were almost white. Brooding was performed by the ♀, while her mate carried food to the nest. To begin with, the ♀ would tear small pieces from the carcases to feed the chick, but as time passed and the young bird grew, the portions offered became bigger. The ♂ occasionally carried a tuft or clump of grass to the nest and in several instances the chick was observed being fed grass. When it was about four weeks old, we released, on two occasions, live young rabbits and these were killed by the adults and fed to the chick.

To ensure against any possible vitamin D_3 deficiency in the chick's diet, we decided, on veterinary advice, to use a synthetic supplement, activated F-dehydro Cholesterol, concentrated strength 40,000 i.u./g. This was diluted with warmed corn oil to form a solution equivalent to 10,000 i.u./cc, and injected into the body cavity of the rats and fish at the rate of 1 cc/kg of food weight.

An unusually warm spell of weather after the late hatching gave us some concern for the young bird's welfare. However, although the temperature once reached as high as 34°C, the ♀ would stand over the youngster on hot days with wings partially spread to provide shade, and it survived. At six weeks, feathers began to emerge and the eaglet

was restless and jumping about the nest. It clutched sticks in its talons and bent and made mock attacks upon them with its beak. Sometimes it shredded part of a stick with its mandibles while holding it down with its feet. At this stage, when the parents brought food to the nest, the youngster would grasp it with clutching talons and tear it to bite-sized portions with its beak. The ♀ was spending less time at the nest and occasionally left the youngster alone with its food.

Gradually the adults fed the youngster less frequently. The eaglet grew hungry and its vocalizations were very audible. This behaviour continued for two weeks while we waited anxiously for its first flight. Finally, on 25 August, it flew about 9 m and perched atop the rock cliff. In the 13th week, it took its first bath. By this time the parents paid little attention to the youngster and had ceased to feed it. At long last in that week we observed it pulling a rat from the food pan. It grasped the rat in its talons, flew to a ledge on the cliff face and tore it apart with its beak. It was completely independent.

PRODUCTS MENTIONED IN THE TEXT

F-dehydro Cholesterol: synthetic vitamin D_3, manufactured by Natural Biochemical Corporation, Cleveland, Ohio 44128 USA.

Vionate powder: vitamin-mineral supplement, manufactured by E. R. Squibb & Sons, Inc., Princeton, NJ 08540, USA.

Zu/Preem Bird of Prey Diet: manufactured by Riviana Foods, Inc., Hills Division, Topeka, Kansas 66601, USA.

REFERENCE

BROWN, L. & AMADON, D. (1968): *Eagles, hawks and falcons of the world.* Feltham: Country Life Books.

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