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Successful hatching of a North Island brown kiwi *Apteryx australis mantelli* at the National Zoological Park, Washington

PAMELA S. DAVIS¹ & GUY A. GREENWELL²

¹Animal Keeper and ²Curator, Birds Unit, Office of Animal Management, National Zoological Park, Washington, DC 20009, USA

In January 1975 a ♂ North Island brown kiwi *Apteryx australis mantelli* at the National Zoo hatched a chick, which we believe to be the first captive reproduction of a kiwi outside Australasia. There are records of hatchings in New Zealand and at Sydney Zoo and of laying and incubation at the London Zoo but we have found no others

(Grieve, 1913; Renshaw, 1917; Gibbings, 1947; Hutchinson, 1947; Harman, 1950; Yealland, 1953; Steinbacher, 1958; Anon, 1961; Hallstrom, 1967; Wenzel, 1969; Clayton, 1972).

Attempts to breed the kiwi at Washington began when a pair was received in October 1968 as a gift from the Government of New Zealand.

The first egg was laid almost a year later on 14 August 1969 but was broken by the birds. A further four eggs laid on 9 September, 14 October, 19 November and 23 December were removed for incubation but were later discovered to be infertile. Because of this and our conviction that it was the smaller bird (the ♂ in most pairs) which was laying, we believed we had two ♀♀ and applied to the New Zealand Government, who, although convinced that they had sent a pair, generously sent two more ♂♂.

In the meantime it had been established by vent sexing that one of the original birds was a ♂, but five more infertile eggs were laid on 4 July, 22 September, 30 October and 6 December 1970 and 11 September 1971. At this point the ♀ stopped laying and no eggs were produced during 1972 or 1973.

The two new birds arrived on 18 July 1972. One was retained at the National Zoo as a mate for the original ♀ and was introduced to her on 2 April 1973. The two extra ♂♂ were sent to other collections, one to Brookfield Zoo, Chicago in late 1972 and the other to join a single ♀ at San Diego Zoo in April 1973.

In early 1974 the interior of the kiwi cage in the Bird House was renovated. The 50 cm deep earth covering in the 3 × 4 m cage was removed and replaced with new earth, well mixed with peat moss, and artificial plastic plants, including small tree ferns were used to give the impression of a New Zealand forest floor. The cage was darkened by an opaque ceiling, but the stretched piano wire front was open to the dimly lit viewing area. At night the cage was lit with an overhead front bank of fluorescent tubes and by day a single suspended 100 W blue incandescent bulb or 250 W blue floodlamp. This crude daylight reversal system did not, however, result in significant daytime activity by the kiwis.

A nestbox of exterior grade plywood, divided into two compartments 61 × 66 × 41 cm high, with arch-topped entrances 15 × 30 cm high and with no bottom was buried to a third of its height and the earth in the interior scooped out. In the top of each compartment was a sliding viewing door some 13 × 13 cm. A plywood worm box 91 × 48 × 30 cm deep, with a screened bottom, was buried to within 7.5 cm of its top near the service door into the aviary and the

worm pan placed within so escaping worms were confined. Frequent inspections were made so that any large scale death of earthworms could be detected and any contaminated earth could be replaced easily.

The birds were provided daily with a 'fruit pan' (blueberries, soaked raisins, fruit cocktail, strips of horsemeat, soaked trout chow, chopped oranges and apples), a pan of earthworms *Lumbricus terrestris* (night crawlers) and a container of fresh water. The food items were sprinkled with Squibb's Vionate, a multi-vitamin powder, and oyster shell flour. Earthworms were the preferred food, although the amount taken varied considerably. The consumption of fruit, however, was consistent at 60–100 g per day.

Our kiwis, like their wild counterparts, are very shy and unfriendly creatures which savagely resent any intrusion into their privacy. The ♂ charges myopically and kicks at the nearest human leg or foot. Because we feared that the birds might injure themselves, and also because the chances of successful breeding might be improved by minimising human interference, they were disturbed as little as possible. The amount of food consumed daily was examined, the animals were observed whenever they were out of their box and periodical inspections were made inside the box with the aid of a flashlight.

During one of these inspections on 4 September 1974, it was noticed that the kiwis had been tearing branches from the artificial plants and depositing them in their 'burrows'. On the assumption that they were using the materials for nest building, pine needles were provided.

On 4 January 1975 an egg was seen in the left compartment of the nestbox, being incubated by the ♂ in a nest of pine needles and hair-like kiwi feathers. The ♀ was crouching in the same compartment. When viewed from directly above, the body and shadow of the ♂ had disguised the well defined nest margin which had thus been inconspicuous. This suggests that it might be advisable to ensure that kiwi burrows can be inspected from the side.

More pine needles were placed outside the nestbox entrance and next morning they had been dragged in. The nestbox inspections were then increased to every other day. During the next two weeks, it became apparent that only the ♂

was incubating. Williams (1963) has reported shared incubation in a pair of South Island brown kiwis *Apteryx australis australis* at least in the early part of incubation. Our ♀ showed no interest during the later stages and apart from the initial discovery was found each time in the right-hand compartment. The ♂ was usually asleep, curled in a tight ball on the egg and facing the rear of the box.

On 20 January, he was still covering the egg but facing the box entrance and a curled scrap of what was thought to be white plastic could be seen to the left of the nest. The next day, it was realised that the white material was a piece of egg liner membrane and the chick was seen on 22 January, crouching in the nest. It was the size and shape of a large avocado, a rich tawny colour streaked with black and a miniature replica of the adult, except for a shorter, straight beak. It was dry and no egg fragments were visible so we assumed that these had been eaten by the ♂, as has been reported elsewhere (Gibbings, 1947).

Evening watches were begun and the chick was seen outside the burrow for the first time at 1700 hours on 25 January. It walked rapidly, probing the earth as it went. For the next three days it was seen quite often and seemed to be oblivious to the public and noise. It was first observed drinking water on the 28th and first seen to eat on the 30th. We began weighing the food pans in and out to get a rough measure of food consumption. On 1 February, the chick approached the keeper as she opened the cage door and sniffed her hand, touching it several times. The same day it was seen to spend much of the time pacing along the rear and side walls and a second pan of earthworms plus a few mealworms *Tenebrio molitor* was placed against the rear wall in its path. It had been noticed that the chick was more active when the blue light was switched off and, in fact, when any of the kiwis were active under the blue light, they sought the shadows beneath artificial plants. As a result the cage is now darkened from the time

the building closes each evening until 0900 the next morning to give the birds maximum foraging freedom. In the following weeks, the chick became more shy and secretive and was observed outside the burrow less often. When the flashlight checks were made, all three birds were in the right nestbox, sleeping soundly.

Whenever we attempted to examine the chick the violent reaction of the adults made us concerned that it might be accidentally injured and therefore handling was kept to a minimum. Although we would have liked more information, we attempted to weigh it only once a month. On 22 February it weighed 352 g and on 17 March 444 g. It seemed sound and strong. By 19 April, it weighed over 600 g.

PRODUCT MENTIONED IN TEXT

Vionate: a multi-vitamin powder, manufactured by E. R. Squibb & Sons, Inc., Princeton, New Jersey, USA.

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