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Superb Lyrebird *Menura novaehollandiae* Nesting in Sherbrooke Forest, 1974 to 1996

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This paper is dedicated to the memory of Isobel Bradley

Summary

The field reports of the Sherbrooke Lyrebird Survey Group were abstracted for details of Lyrebird nesting for the years 1974 to 1996. There were 107 nests brought to apparent completion, which were classified into those that were low (ground level to 1.5 m), intermediate (greater than 1.5 m and up to 4 m) and high (greater than 4 m). The analysis was confined principally to the low group where the nesting events could be followed most effectively. However, analysis of the success rate indicated that there was no statistical difference between the three groups. In the low group the success rate was 39 fledged chicks from 66 nests with eggs (59%). There was a hatching failure of 18/24 eggs in the low group. In 11 instances the egg was removed from the nest, in most cases by a predator, in four the egg was infertile or death *in ovo* occurred and in two cases the egg was abandoned. In the low group there were five cases of predation of the chick in the nest and one of predation of the parent.

Introduction

The nesting of Superb Lyrebirds *Menura novaehollandiae* in Sherbrooke Forest has been described by Reilly (1970) for the years 1958 to 1965, and by Lill (1980) for the years 1973 to 1976. Reilly's (1970) paper was compiled from the field notes of the members of the Sherbrooke Lyrebird Survey Group (the Group). This paper reports the further experience of the Group for the 23 years from 1974 to 1996.

Sherbrooke Forest

The location and geographical features of Sherbrooke Forest have been described by Lill (1980, 1996). On the ridges and slopes the predominating tree is the Mountain Ash *Eucalyptus regnans*, with a middle storey consisting mainly of acacias, both Blackwoods *Acacia melanoxylon* and Silver Wattles *A. dealbata*. On the sheltered slopes and in the moist gullies the tree and shrub population includes Hazel Pomaderris *Pomaderris aspera*, Austral Mulberry *Hedycarya angustifolia*, Southern Sassafras *Atherosperma moschatum*, Blanket-leaf *Bedfordia arborescens* and Musk Daisy-bush *Olearia argophylla*. On the lower slopes and in the gullies there are Soft Treeferns *Dicksonia antarctica* and Rough Treeferns *Cyathea australis*. All of these trees and treeferns can provide nesting sites for Lyrebirds (see Plates 41, 42, and 43).

Collection of data

The number of members in the Group able to visit the forest frequently has varied over the years, so that the probability of finding nests has also varied. Some parts of the forest are difficult of access, and so do not feature regularly in the reporting.

Nesting activity

Descriptions of the Lyrebird nest have been given by Campbell (1900), Beruldsen (1980) and Smith (1988). Plate 44 shows a partially built nest at the platform and cradle stage. The external dimensions of the nests are very variable, but the internal ones are relatively constant (Table 1).

Nest building usually commences in autumn, and is well advanced by May and June. In the current series two nests were found under construction in March (14th and 24th) and eight in April (13th, 18th, 22nd, two on the 24th, 25th, two on the 26th). A late start was recorded for 20 August, and the nest was apparently complete by 4 September. The parent bird of this nest was seen feeding the chick in early November, but was killed sometime after this. After the nest is complete in the

A Lyrebird nest surrounded by a mass of Wire Grass *Tetrarrhena juncea* and built in the fork of a Musk Daisy-bush.

Plate 41 Photo: G.G. Carmichael

observer's estimation there is a variable period before the laying of the egg, during which the female leaves it completely. The longest period that we have on record for this delay was at least 58 days. There were three other instances where the delay was between 50 and 56 days. The shortest interval was a minimum of seven days.

As it is undesirable to go to Lyrebird nests too frequently, particularly when an egg or chick is present, it is possible to give only minimum incubation periods for the egg. Where visits were frequent enough to give a reasonable degree of precision, the minimum period was 47 days, with one instance of 49 days. It is likewise not practicable to give the exact time between hatching and the chick leaving the nest,

Table 1

Internal measurements of Lyrebird nests: mean values in cm, with standard deviations.

Number of nests	*Depth*	*Width*	*Height*
11	35.2 ± 3.1	24.3 ± 1.3	26.7 ± 1.7

A Lyrebird nest at the base of a Rough Treefern.

Plate 42 Photo: G.G. Carmichael

but there is one precise figure for 46 days. Several other observations converge on a figure of 46 or 47 days.

Females that have been banded or have otherwise identifiable characteristics are known to nest consistently in the same part of the forest, but after the chicks have fledged they may be seen with their offspring several hundred metres from their nesting sites.

Analysis of nests and their fates

The nests that were brought to apparent completion have been divided into three groups according to their height above ground. A low group, i.e. those that were most easily monitored and therefore provide the most reliable analysis, were between ground level and 1.5 m. An intermediate group consists of those that were greater than 1.5 m and not more than 4 m above ground level. However, all those nests in the tops of treeferns, regardless of height, were included in the intermediate group. The high group consists of the remainder of nests, which were up to about 20 m above ground level. A successful nesting is counted as one in which the chick was seen

Detail of a nest containing an egg (arrowed) partially obscured by feathers from the parent bird. A feltwork of twigs and rootlets is shown extending over the top of the entrance. This nest was close to the ground between two Hazel Pomaderris trees.

Plate 43 Photo: G.G. Carmichael

out of the nest, or one where there is no reason to believe that anything untoward had happened to it after its last sighting in the nest. Reilly (1970) relied on the sighting of banded chicks to gauge the nesting success rate, but was left with six unaccounted for, so that the success rate could have been underestimated. Lill (1980) did not define his criteria for a successful nesting.

The nesting outcome (i.e. success or failure) for the nests in the three groups is given in Table 2. Table 3 gives the data on egg-laying, hatching and successful fledging for the nests of the low group.

In the low group of completed nests there were 29 that did not result in the fledging of a live chick. Eggs were laid in 24 of them. Eighteen of these eggs failed to reach the hatching stage. In six cases the egg was removed by an unknown agent, with shell fragments being found in or near the nest. Predators such as the Red Fox *Vulpes vulpes*, dogs or possibly cats were probably to blame. It was thought that a nest-robbing bird, possibly a Pied Currawong *Strepera graculina*, was responsible in one instance. Five eggs were removed without there being any shell fragments in or near the nest. Possibly the same predators could be incriminated, but human intervention is suspected in at least one of the instances. Four eggs were either infertile or death *in ovo* occurred. A branch falling on the nest accounted for one instance. In two cases the eggs were abandoned for reasons unknown, but it is most likely that the parent birds were killed by a predator or the eggs were infertile. In the case of infertile eggs, we have examples of the female bird either incubating them for far longer than the usual period, or else ignoring them completely from the time of laying.

In one case of nest failure in the low group there was insufficient information as to whether egg laying or hatching occurred.

A platform and partially completed cradle of a nest at the base of a Mountain Ash tree, showing the entry step already in place.

Plate 44 Photo: G.G. Carmichael

After hatching, predation of the chick took place in five instances, and in another predation of the parent was the cause of the chick's demise.

In the intermediate and high groups of nests the evidence for the status of the egg or chick may only be indirect; for example, seeing the parent bird feeding the chick.

Table 2

Nesting outcome for the three Lyrebird groups.

Nest group	*Success*	*Failure*	*Total*
Low	39 (57%)	29 (43%)	68
Intermediate	10 (39%)	16 (62%)	26
High	6 (46%)	7 (54%)	13
Total	55	52	107

Chi-square = 2.8502, degrees of freedom = 2, P $>$ 0.1 (not significant)

Table 3

Number of eggs laid, number and percentage of eggs hatched and number and percentage of hatched eggs giving fledged chicks for the low group of nests.

No. nests	*No. with eggs laid*	*No. eggs hatched*	*Successfully fledged*
68	66 (97%)	48/66 (73%)	39/48 (81%)

Among the nests which failed in the intermediate group, hatching occurred for three of the eight eggs known to be laid. Predation of the parent was responsible for the death of two of the nestlings. In another case the chick fell out of the nest and drowned in the creek below.

In the high group of apparently completed nests that failed to produce a live chick to fledging stage, the fate was known only in one instance. In this case the nest was about 10 m from the ground in the top of a Mountain Ash stump. The nest was damaged and there was no further parental activity evident. It was presumed that a bird of prey had taken the chick.

Proof of the identity of predators is almost always lacking, the surrounds of nests usually being unsuitable for the detection of foot-prints. Red Foxes and dogs are known to be in the forest, and they are probably responsible for the majority of chick losses.

Discussion

The overall success rate for all known nests that were brought to completion at all three levels was 55/107 = 51%. This compares with 63% given by Reilly (1970). In Reilly's study the hatching rate was 38/44 = 86%. The hatching rate was 73/95 = 77% for all eggs known to have been laid in the present study. Reilly (1970) stated that of the six unhatched eggs two were infertile and four were deserted. Eggs being removed from nests is, apparently, a more recent problem in Sherbrooke Forest.

There was no significant difference in the success of nests in the various height classes (Table 2), suggesting that height above ground is not a factor in the safety of the egg or chick.

Smith (1997) discussed a model for the recruitment of breeding Lyrebirds required if the population were to remain stable. He concluded that for bare survival the success rate for egg-to-breeder stage would need to be 22%. He used Reilly's (1970) egg-to-fledging success rate of 54% and deduced that a survival rate of 41% between fledging and breeding would be necessary for bare population survival. The Group's figure of 59% for nestling success may indicate that the true figure is somewhere between 50 and 60%. The problem arises in estimating the success rate from fledging to breeding stage, and with the data currently available this must remain hypothetical. The nature of the difficulty is shown in the Group's chick-banding program. This program gives only a qualitative indication of the dispersal of Lyrebirds within and outside the boundaries of the Forest, and provides evidence concerning their longevity. However, some of the observations are relevant to the present discussion. In the years 1971 to 1993, 32 Lyrebirds were colour-banded as nestlings. Of these, 17 (53%) have been sighted in the Forest in years subsequent to the banding year. The sex of the birds became known in six cases, three being female and three male. Of interest is that two of the females, White/Red/White (banded in 1971) and White/White/Red (banded in 1982) were unsighted for 12 and four years respectively. One of the male Lyrebirds, White/Red/White (banded in 1985), went unseen until 1991 and has not been seen since.

Until more sophisticated methods for tracking Lyrebird movements are developed, estimates of post-fledging survival must remain qualitative and unproven. Nevertheless, there is a clear implication that elimination and control of introduced predators must be pursued vigorously if the Lyrebird population of Sherbrooke Forest is to be protected.

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