AUSTRALIAN BIRD WATCHER 1993, **15**, 137-142

Notes on the Breeding Behaviour of the Red Variety of the Eastern Rosella

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Summary

The breeding of a wild pair of Eastern Rosellas *Platycercus eximius* was studied during spring 1991 near Bendigo, Victoria, when the birds used an artificial nest-box. The female was an example of the red variety; the male was normal in colour. They raised two broods, of six and four young, between 9 September-27 October and 7 November-16 December 1991 respectively. All the young were normal in plumage colouration. Parental behaviour, breeding success and post-fledging behaviour of the young are described.

Introduction

In a previous article (Tzaros 1992), mention was made of three individuals of the erythristic mutant of the Eastern Rosella *Platycercus eximius*, observed in the Bendigo district of Victoria. The breeding biology of the Eastern Rosella is reasonably well known. Wyndham & Cannon (1985) found that Eastern Rosellas started the majority of their nests between mid October and mid December, laid first eggs between mid November and mid December, and fledged young from early December to early February. They also recorded that eggs were laid at one- or two-day intervals and clutch sizes ranged from three to nine with a mode of six. Forshaw & Cooper (1981) gave the incubation period as 19 days and a nestling period of approximately 35 days. Brereton (1963) stated that the Eastern Rosella generally has two broods, producing as many as twelve young per season. Schodde & Tidemann (1986) recorded that Eastern Rosellas are usually single-brooded but occasionally rear two broods.

The red variety has been bred in captivity (Smith & Smith 1990) but has not previously been known to breed in the wild. Smith & Smith (1990) stated that most red abnormalities are caused through deficiencies or sickness. It may be expected that such a mutant would have increased vulnerability owing to the abnormal plumage (J. Forshaw pers. comm.).

This paper describes the successful breeding of a female red variant mated to a normal male, in an artificial nest-box in an area lacking natural nest sites.

Study areas and methods

The study sites are located in the Bendigo district of Victoria (36°40'S, 144°15'E). Nest-boxes were erected to facilitate the study of breeding of two separate groups of Rosellas. There was one red mutant in each of the two groups, both of these birds being females. Six wooden nest-boxes (three at each site) were placed on the trunks of eucalypts at an average height of 3 m. Nest-boxes were constructed from pine board and made to the following dimensions: 50 cm tall, 20 cm deep, 25 cm wide, entrance hole 6.5 cm diameter; a hinged lid overhung the front of the box to prevent rain water from entering the hollow. These were then fastened to the trees by using standard fencing wire in a way that would not damage the tree. All nest-boxes were placed at an average distance of 165 m apart and were situated approximately in the centre of each pair's range. Frequent observations of the Rosellas in the field and regular inspections of the nest-boxes were made.

Study site one

At this site, where the successful nesting occurred, the habitat was a reasonably level tract of open woodland/farmland. Vegetation consisted mainly of exotic grass species such as Onion Grass *Romulea* sp., Cape Weed *Arctotheca calendula*, Paspalum *Paspalum* sp., Spiny Rush *Juncus acutus* and Dock *Rumex* sp., as well as the native Wallaby Grass *Danthonia* sp. Indigenous eucalypts included Grey Box *Eucalyptus microcarpa*, Yellow Box *E. melliodora*, Yellow Gum *E. leucoxylon* and River Red

Gum *E. camaldulensis* (Tzaros 1992). Ornamental plants included various *Callistemon, Melaleuca* and *Eucalyptus* spp. growing in a farmhouse garden.

Daily visits were made, usually three times per day (c. 0800 h, 1200 h and 1700 h) but occasionally twice per day (early morning and late afternoon). Nest inspections were made when the female was observed to leave the nest to feed or be fed by the male. The first observation of the mutant bird at the nest was made on 14 August 1991. Further observations were recorded in a log book throughout the breeding period, the last observation being made on 17 December 1991. Additional observations of the birds during the non-breeding period were also recorded. A total of 300 observations was made between 14 August 1991 and 7 July 1992. A greater amount of time was spent observing the birds during the breeding period (total of 31 h) in comparison with non-breeding observations (total of 9.5 h). Observations were made using 10x24 binoculars usually from 50-80 m away, and most observations of the birds at the nest were recorded from a hide 3 m away. Photographs were also taken to confirm plumage details.

The second brood of young raised by the pair was banded (bands supplied by the Australian Bird Banding Scheme, ANPWS) with stainless-steel bands, placed on the left leg on females and the right leg on males (sexed by cloacal differences).

Study site two

The habitat was relatively open forest land with a light understorey. Vegetation consisted of Grey Box, Yellow Gum, River Red Gum, Red Stringybark *E. macrorhyncha*, Drooping Cassinia *Cassinia arcuata*, Spreading Wattle *Acacia genistifolia* and Ausfeld's Wattle *A. ausfeldii* within the boundaries of a three-hectare protected bushland reserve. Adjacent to this was a section of creekside farmland which the red bird occasionally visited.

The red mutant bird was first seen here on 27 October 1991, but it failed to breed owing to the lack of nesting facilities at the beginning of the breeding period. Usually daily visits were made at c. 1630 h. Three nest-boxes were placed in the area on 10 November 1991, near the end of the breeding period of the local Eastern Rosellas. The last recorded observation before preparation of this note was made on 1 October 1992, when the red mutant was sighted emerging from a nest-box. In total, 41 observations (8.5 h) were made on the red bird and its companion.

Results

Incubation, clutch size and breeding notes

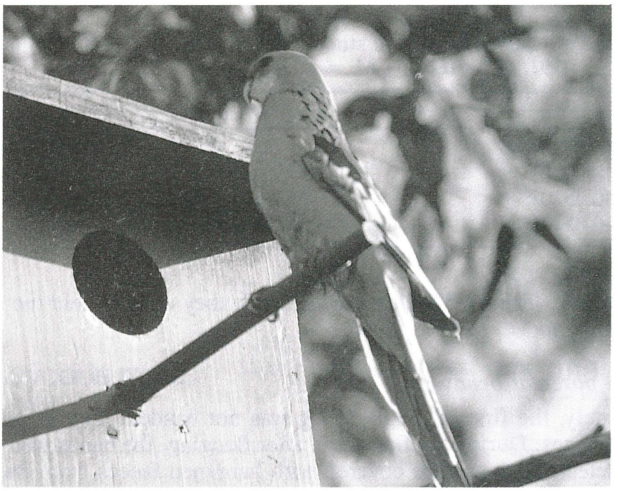
At the first study site, a nest-box was placed 3.2 m high on the trunk of a River Red Gum in the approximate centre of the Rosella's range (Plate 19).

The red bird first visited the nest-box on 17 August 1991, with the first egg being laid on 21 August 1991 (Table 1). Further eggs were laid at two-day intervals, with the last egg being laid on 2 September 1991. Seven eggs were laid, with six hatching, the first on 9 September 1991 and the last on 19 September 1991 (19 days incubation time). The nestlings fledged between 31 and 37 days old.

The second brood was similar to the first. The red female laid six eggs on this occasion, with five hatching and four surviving. One chick died in the nest between 16 and 22 days old. These young were banded between 22 and 28 days old on 4 December 1991 (Table 2). The young fledged at c. 33 days old.

Plumage description, vocalisations and diet of juveniles

When the young hatched, they were covered in a thin layer of down. At the age of approximately 8 days, pin feathers appeared on the head, wings and tail. Juveniles were similar in plumage colouration to adult normal females but the feathers of the mantle were edged olive-green, whereas in adult females the feathers are edged pale yellow (Wyndham et al. 1982). There was also less red on the head, neck and breast, and the colour of the beak in juveniles was orange in comparison with the off-white colour of the adults (Wyndham & Brereton 1982). The young showed no signs of abnormal colouring and appeared normal.



The red female Eastern Rosella at artificial nest-box, 4 October 1991

Plate 19 Photo: Chris L. Tzaros

Table 1
Laying, hatching and fledging dates and incubation and nestling periods of Eastern Rosellas at study site one: 21 August-17 December 1991.

	Laying	*Hatching*	*Incubation time (days)*	*Fledging*	*Nestling period (days)*
First Clutch	21.8.91	09.9.91	19	16.10.91	37
	23.8.91	11.9.91	19	16.10.91	35
	25.8.91	13.9.91	19	16.10.91	33
	27.8.91	15.9.91	19	17.10.91	32
	29.8.91	17.9.91	19	18.10.91	31
	31.8.91	19.9.91	19	20.10.91	31
	02.9.91 [a]	—	—	—	—
Second Clutch	19.10.91	1.11.91	19	7.12.91	36
	21.10.91	3.11.91	19	8.12.91	35
	23.10.91	5.11.91	19	8.12.91	33
	25.10.91	7.11.91	19	9.12.91	32
	27.10.91	9.11.91	19[b]	—	16-22
	29.10.91 [c]	—	—	—	—

[a]egg failed to hatch [b]nestling died [c]egg failed to hatch

The juveniles were often located by their loud, begging communication calls. These were similar to the whistle of an adult Eastern Rosella but were lower in pitch, contained more syllables and did not have any rhythm.

Leaves and fruit constituted most of the young Rosellas' diet, these being procured from *Eucalyptus* spp. They were occasionally observed to feed on seeding grasses, exploiting these items both while standing on the ground and by reaching grass stems

Table 2
Details of Eastern Rosellas banded at study site one (second clutch only) on 4 December 1991. (F = female, M = male, L = left, R = right).

Band No.	*Age/Sex*	*Leg Banded*
240 15201	22 days, F	L
240 15202	24 days, F	L
240 15203	26 days, F	L
240 15204	28 days, M	R

from perches (e.g. fences). When on the ground, they usually held the seeding stem down with one foot.

Juvenile and parental behaviour

Unfortunately, the first brood of young was not banded. The second brood was banded as nestlings. During the first week after fledging, the bands were surprisingly difficult to detect, as they were covered with hardened faeces from the floor of the nest. They gradually became visible but were still hard to detect because of the squatting posture that rosellas tend to take while perching.

Birds of the first brood roosted in a cluster of River Red Gums 25 m west of the nest for the first 10-11 days after fledging. At 42-51 days old (5-14 days after fledging), they began to exercise and practice flying, thus broadening their range. By 47-55 days of age, their range covered an area of approximately 300 m^2. The red female was seen entering the nest-box on the day that the last young of the first clutch emerged, and she laid the first egg of the second clutch four days later.

For eight days after fledging the second brood roosted in a mixture of Grey Box, Yellow Box and Yellow Gum trees, 125 m south-west of the nest. One second-brood juvenile (banded) was seen perched and feeding with its parents when it was 69-77 days old. The parent birds were seen to regurgitate food for their young until the young were 42-51 days old (5-14 days after fledging).

The red female seemed to be more cautious at the nest than the male; both birds were very aggressive towards other rosellas in their territory and participated in a pugnacious aerial dispute. During the incubation period the male was very attentive, accompanying the female whenever she left the nest (on 37 of 38 occasions). They usually left the nest at approximately 0810 h and 1700 h during the incubation period of the first clutch. This depended mainly on the weather conditions as the birds left the nest earlier in warmer temperatures. On average, the red female left the nest for 5 min. 38 sec. When there were nestlings, however, she left the nest more frequently (mean 5 times per day) and for longer periods (average of 22 min. 15 sec.). The male was observed to enter the nest when the nestlings were around 19 days old. When the female left the nest with the male, the male perched 2 m from the nest and uttered a soft warble which resulted in the female emerging from the nest.

During higher temperatures in the incubation period of the second clutch, the red female was observed to leave the nest much more regularly in comparison with the first clutch (average of 4 times per day). Observations of the red female leaving the nest, almost always with the male, were usually made at c. 0800 h, c. 1110 h, c. 1500 h and c. 1745 h.

The young stayed in their natal area for approximately 10 weeks before possibly dispersing.

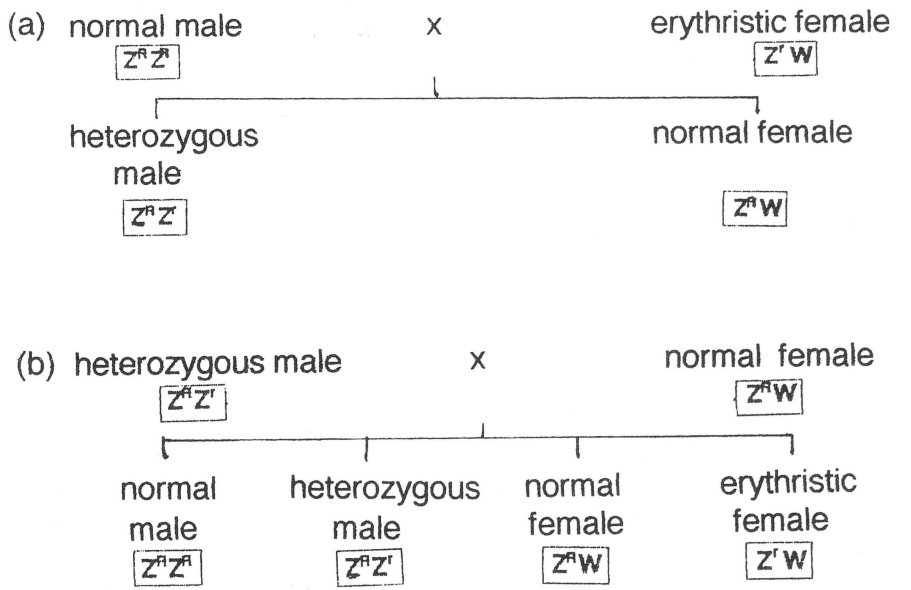


Figure 1. Genetic diagram displaying Eastern Rosella progeny of (a) normal male X erythristic female, (b) heterozygous male X normal female mating. Z and W are the sex chromosomes, R = normal gene, r = erythristic allele.

At the second study site, where a different red female Eastern Rosella had paired with a normal male Eastern Rosella, the birds did not attempt to breed as the nest-boxes were erected too late in the season and the scarce natural hollows were already occupied by other Eastern Rosella pairs. However, the red female and her companion were observed on several occasions to perch on one of the nest-boxes. Even throughout the non-breeding period, the pair claimed one particular nest-box and was observed to protect it from other Eastern Rosellas.

Competition for hollows was prevalent at both sites. At site one, the nest-box that the birds had previously used in 1991 was not available to them in 1992 as it had been taken over by Common Starlings *Sturnus vulgaris*, resulting in the pair moving to another nest-box 80 m south.

At site two, Starlings were absent owing to unsuitable habitat but the red bird and her mate still faced competition from other rosellas.

Discussion

In the Eastern Rosella erythrism is caused by a sex-linked recessive mutation. Therefore, all male progeny of the red female would carry the mutant gene, though they would look normal, while female progeny would have normal plumage and carry normal genes (Figure 1a). When the male progeny (heterozygous males) mate and produce offspring, half of their female young would be expected to be red and half normal; all of the male young would look normal, but half would carry the red mutant gene (L. Joseph pers. comm.) (Figure 1b). This has been verified in captivity by

selective breeding (Smith & Smith 1990). Contrary to expectation (Smith & Smith 1990), I found the red mutant to be normal in behaviour and breeding biology.

Results found in previous studies (Forshaw & Cooper 1981) suggest that wild Eastern Rosellas occasionally have two broods. The pair I studied in 1991 started to nest in late August and finished that brood in late October; a second clutch was laid in late October and the resultant young fledged in mid December (cf. Wyndham & Cannon 1985). Schodde & Tidemann (1986) mention that occasionally two broods may be raised each year. One other pair of normal Eastern Rosellas which nested 110 m from the nest-box containing the brood of the red female, began to nest in mid September and raised only one brood.

The red females' clutch size, incubation, and the nestling and fledging times and plumage of her young were all normal, and the laying of eggs and fledging of young were asynchronous.

All rosellas are described as being sedentary (Forshaw & Cooper 1981), and this has been confirmed by Wyndham & Cannon (1985), who marked several nestlings with patagial tags and found that within a few months of fledging, these young disappeared, either dispersing or dying (suggesting that patagial tags increase predation).

The fledglings at study site one remained in the area for c. 70 days. Two banded young were seen 150 m south-west of the nest approximately 62 days after fledging. It is presumed that these birds dispersed along with other young Eastern Rosellas in the vicinity. Further work is required in order to determine whether fledglings disperse and to ascertain whether they return to their natal area to breed the following season.

The erection of artificial nest-boxes has enhanced the breeding success of Eastern Rosellas in an area lacking nest hollows, and has thus increased the local Eastern Rosella population.

Acknowledgements

I am grateful to Stephen Debus, Andrew Isles, Ian McAllan and John Robinson for constructive comments on the manuscript. I also thank Mr John Ipsen for banding the nestling rosellas, Rob Jarvis (Dept Conservation & Natural Resources of Victoria) for permission to erect nest-boxes in the reserve, David McDonald for the use of his observation hide and Leo Joseph and Joseph M. Forshaw for commenting on the mutation.

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Received 16 March 1992