BREEDING OF SONG THRUSHES AND BLACKBIRDS AT ST. ARNAUD, NELSON

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INTRODUCTION

Where the Travers river runs into Lake Rotoiti, Nelson Lakes National Park (41° 50'S, 172° 50'E), there is a flat, 180-acre area (Fig. 1) of introduced grasses with scattered matagouri shrubs (*Discaria toumatou*). This grassland appears to be partly natural and partly the result of fire and grazing by sheep and cattle. It lies at an altitude of 2,000ft. and is surrounded on three sides by extensive beech forest (*Nothofagus* spp.) on mountains rising to 6,500ft., and on the fourth by Lake Rotoiti. The annual rainfall is about 70 inches. Snow seldom lies for more than a few days and may fall at any season. Winter frosts of 10 to 20°F. are normal.

Song Thrushes (*Turdus ericetorum*) are abundant on this isolated piece of grassland. A few are found on small clearings further up the Travers river, but they are rare on alpine grassland at 4,500 ft. Blackbirds (*Turdus merula*) are also plentiful on the grassland in the valley, but are more evenly distributed through the beech forest than Thrushes and more often seen above the timberline.

METHODS

The author was stationed at St. Arnaud for 18 months and about one week was spent in the area every month from October 1962 to December 1965. Dr. P. C. Bull suggested that the opportunity should be taken to collect breeding data from this somewhat unusual population

Fig. 1 — Travers Valley, showing grassland with clumps of matagouri in foreground and beech forest on the surrounding mountains.

of Thrushes and Blackbirds living mainly in native vegetation and at a relatively high altitude. During the breeding season nests were looked for on 17 days in 1963, 25 days in 1964 and 19 days in 1965, at irregular intervals. From 1963 to 1965 186 Thrush and 38 Blackbird nests were found, mostly in the study area but including 24 Thrush and 9 Blackbird nests from around St. Arnaud township, which is about six miles north and similar in altitude and habitat. Trees containing nests were lightly blazed and numbered in pencil. Nest Record cards were completed for all nests and deposited in the Society's collection. Although an analysis of Thrush and Blackbird cards for the whole of New Zealand is in preparation, it was thought worthwhile to summarise the main results from this rather atypical area separately, and compare them with those of an earlier study near Auckland by Bull (1946).

NEST SITES

The nest sites of Thrushes and Blackbirds did not differ significantly although Thrushes tended to favour matagouri (Table 1).

TABLE 1 — Comparison of nest sites of Song Thrush and Blackbird

Site	Song Thrush			Blackbird		
	No. of Nests	%	Mean Height ft	No. of Nests	%	Mean Height ft
Matagouri	98	63.2	7.0	18	48.7	6.4
Coprosma sp.	24	15.5	5.1	4	10.8	5.8
Beech	17	11.0	12.8	5	13.5	11.6
Manuka (*Leptospermum scoparium*)	5	3.2	6.2	4	10.8	7.0
Broadleaf (*Griselinia littoralis*)	1	0.7	10.0	2	5.4	10.0
Other species	7	4.5	6.4	3	8.1	11.0
On ground	3	1.9	0	1	2.7	0
Total	155	100	7.2	37	100	7.4

Three Thrush nests were constructed on top of previous years' nests. Only one nest was used for two clutches in the same year.

NEST MATERIALS

Although nesting in similar sites on the same area, Thrushes and Blackbirds chose different building materials (Table 2).

TABLE 2 — Composition of 136 Song Thrush and 35 Blackbird Nests

Component	Song Thrush		Blackbird	
	Times recorded	%	Times recorded	%
Grass	128	42.1	25	28.1
Lichen	61	20.1	1	1.1
Twigs	39	12.8	14	15.7
Moss	35	11.5	24	27.0
Wool	30	9.9	7	7.9
Roots	7	2.3	13	14.6
Bracken	3	1.0	0	0
Bark	1	0.3	5	5.6

Thrushes seemed to prefer dry grass, while Blackbirds used more roots and twigs. Perhaps the most noticeable difference is in the use

of lichen (*Usnea* sp.). This grows abundantly on matagouri bushes but is generally not used by Blackbirds which take moss from the ground instead.

POPULATION DENSITY

Only in 1965 was an attempt made to cover the whole area systematically. Eighty-nine Thrush and 19 Blackbird nests were found containing eggs or chicks on the 180-acre area, a density of 25 and 6 pairs per 100 acres respectively, assuming two clutches per pair. At least 20 empty Thrush nests were also found which seemed to have been deserted before laying began. More Blackbirds than Thrushes were seen on the area and more Blackbird nests may have been missed as they are harder to find. Bull (1946) estimated that on Auckland farmland there were 31 pairs of Thrushes and 22 pairs of Blackbirds per 100 acres.

BREEDING SEASON

The date of the first egg laid was estimated from the incubation or fledging period for nests not found during laying, as described by Myres (1955). This was done for all occupied nests, even if visited only once (Table 3).

TABLE 3 — Estimated date of first egg in 121 Song Thrush and 28 Blackbird clutches

Date	Song Thrush				Blackbird			
	1963	1964	1965	Total	1963	1964	1965	Total
Sept. 8 - 15	2			2				
16 - 23	1	6	3	10				
24 - 30	2	9	13	24		1	1	2
Oct. 1 - 7	2	7	3	12		1	2	3
8 - 15	3	2	3	8		1	0	1
16 - 23	4	4	1	9	1		5	6
24 - 31	6	3	7	16	1		3	4
Nov. 1 - 7	3	2	4	9	2		2	4
8 - 15	1	1	10	12	1		4	5
16 - 23	4	1	5	10	1		1	2
24 - 30		0	2	2			1	1
Dec. 1 - 7		2	4	6				
8 - 15			1	1				
Total	28	37	56	121	6	3	19	28

Too few clutches are available to justify comparison between years, but Blackbirds seemed unusually late in nesting in 1963. The combined data are used in Fig. 2 to compare the breeding seasons at St. Arnaud and Mangere, Auckland (Bull, 1946). Both species start laying about a month later at St. Arnaud than in Auckland, and Bull even records a few Thrushes laying in mid-winter in June and July. This difference is to be expected from the more severe climate at St. Arnaud, with increased altitude and latitude, although Gurr (1954) did not find that Blackbirds bred significantly later at Dunedin than elsewhere in New Zealand. It is interesting that breeding starts more rapidly at St. Arnaud, so that the peak laying period, 24 - 30 September, is the same as in Auckland.

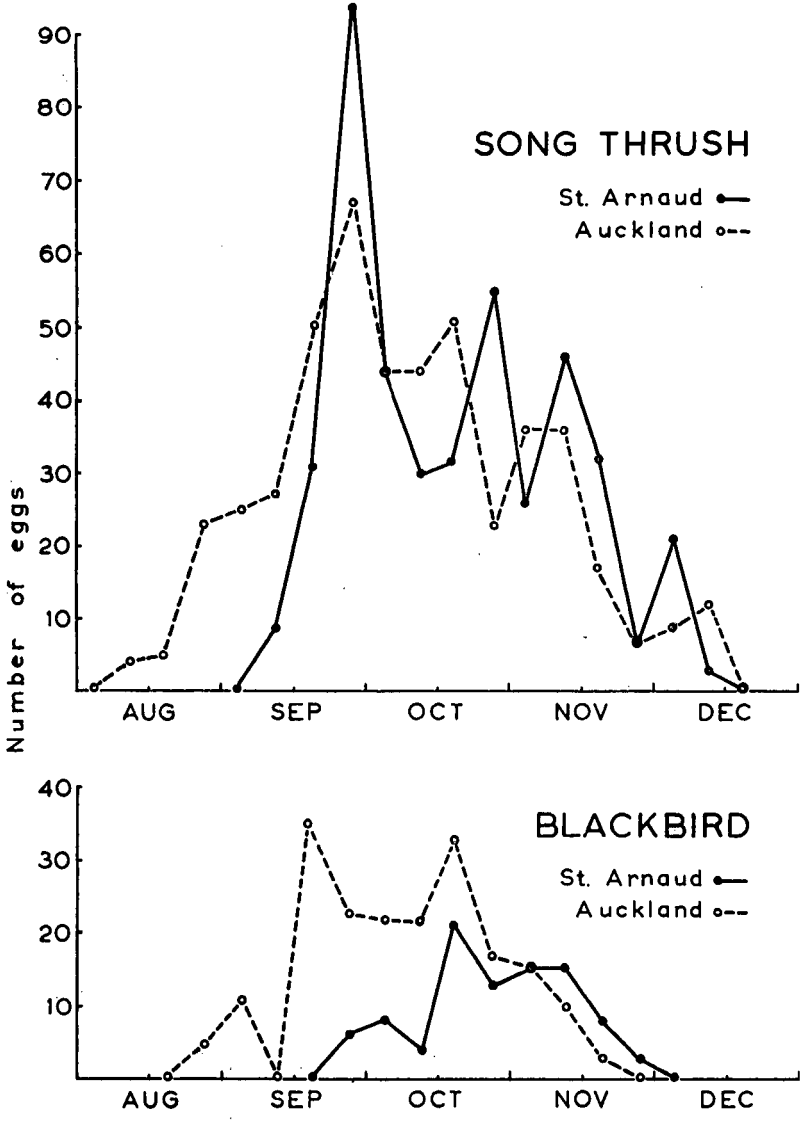

Fig. 2 — Comparison of breeding season of Song Thrush and Blackbird at St. Arnaud and Auckland (Bull, 1946). Bull also records nine eggs in June and July.

CLUTCH SIZE

Clutches were regarded as complete if visits sufficiently spaced showed no change in the number of eggs, or if the parent was definitely incubating for nests visited only once, following Snow (1955a). In addition a few clutches, known to have been incubated by breaking an egg, were included although deserted when found. The seasonal frequency distribution of clutch size (Table 4) shows no significant trend, and there were too few clutches to investigate annual differences.

TABLE 4 — Seasonal distribution of clutch size in 112 Song Thrush and 28 Blackbird nests

	Song Thrush					Blackbird			
Clutch size	2	3	4	5	Mean	2	3	4	Mean
Sept.		3	26	3	4.00		2		3.0
Oct.	2	5	27	3	3.83		7	6	3.46
Nov.	4	3	19	1	3.63	2	1	9	3.58
Dec.		2	4		3.67				
Undated		1	8	1	4.00			1	
Total	6	14	84	8	3.84	2	10	16	3.50

The mean clutch sizes at St. Arnaud (Lat. 42°S) are similar to those of Thrushes (3.91) and Blackbirds (3.52) recorded by Bull (1946) at Auckland (Lat. 37°S); and Snow (1955a) found no change in clutch size of either species from north to south in Britain. The clutches of Thrushes (4.09) and Blackbirds (3.91) in southern England (Lat. 52°N) are larger than in New Zealand, however, and the birds here may have evolved a reduced clutch size with reduced latitude as found in Goldfinches in Australia (Frith, 1957). The predominance of four-egg clutches (73% at Auckland (Bull, 1946); 75% at St. Arnaud) is remarkable compared with the 57% in Southern England (Snow, 1955a). This might be due to the relative uniformity of the New Zealand habitats studied, or a lack of genetic variability.

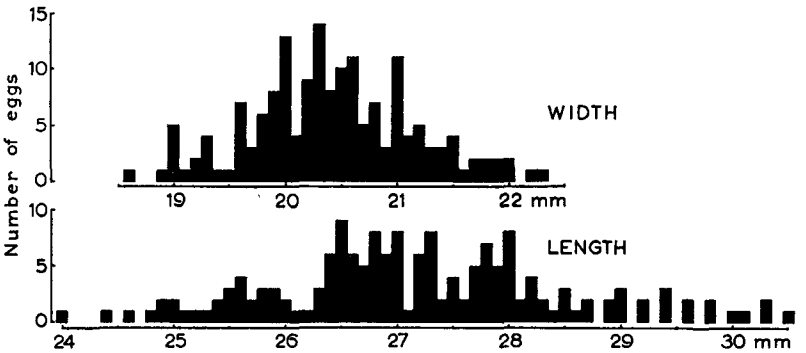

Fig. 3 — Dimensions of 165 Song Thrush eggs measured with vernier calipers to 0.1 mm. The length veries relatively more than the width.

EGG SIZE

The frequency distributions of length and width of 165 Thrush eggs from St. Arnaud measured throughout the 1965 breeding season are shown in Fig. 3. The average size (in mm) was 27.2 x 20.4, maxima 30.5 x 19.3 and 27.3 x 22.3; minima 24.0 x 19.6 and 25.9 x 18.6. British eggs seem a little larger: 28.4 x 20.9 (Kirkman, 1911); 28.7 x 20.9 (Kirkman and Jourdain, 1938); 27.6 x 20.9 (Witherby *et al.*, 1943).

BREEDING SUCCESS

As nests could not be visited regularly, various methods of estimating survival were used. The ultimate fate of 319 Thrush eggs was known: 45 (14%) survived to hatch and 21 (7%) fledged. The corresponding figures for Blackbirds were 42 eggs laid, 18 (43%) hatched and 7 (17%) fledged. Twenty-one Thrush and two Blackbird nests that were already deserted when found are included above, which could overestimate mortality because they last longer than successful ones and hence have a greater chance of being found. On the other hand, as Snow (1955b) points out, the inclusion of nests found with well grown chicks biases the estimate in the opposite direction because many nests fail completely in a far shorter time. A larger sample is made available for analysis by including with the above all nests with some information on either hatching or fledging success (Table 5).

TABLE 5 — Survival of Eggs or Chicks in Clutches whose fate was entirely or partly known.

	Song Thrush				Blackbird			
Number of:	1963	1964	1965	Total	1963	1964	1965	Total
Eggs laid	95	101	234	430	22	11	46	79
Eggs hatched	41	34	63	138	7	7	18	32
Eggs perhaps hatched but not fledged		8	9	17	11		15	26
Chicks fledged	4	7	10	21	7			7
Chicks last seen over half grown	22	8	17	47			4	4
Hatched and perhaps fledged	8	11	27	46		3	7	10

Assuming that chicks last seen half grown also fledged successfully (and any mortality in this group may be considered cancelled by successes in the final category of Table 4) the percentage of eggs laid which gave rise to fledged young was 16% for Thrushes and 14% for Blackbirds.

An independent method of assessing survival is to compare the number of nests containing eggs with the number containing chicks when first found. This avoids some of the previous difficulties since the incubation and fledging periods are similar and dead chicks may remain in a nest as long as deserted eggs. The number of Thrush nests containing chicks when first found was only 20 compared with 165 containing eggs, indicating a survival of 12%. The corresponding figures for Blackbirds are 29 nests with eggs, 5 with chicks; a survival of 17%. This method gives no measure of subsequent chick mortality before fledging.

Because of the infrequent visits to nests and the high total loss, partial loss was seldom recorded, and only three single eggs were known to have been lost from seven otherwise successful clutches. The causes of total nest loss are summarised in Table 6.

TABLE 6 — Causes of loss of 97 Song Thrush and 17 Blackbird nests

Number of nests with:	Song Thrush	Blackbird
Eggs deserted	49	4
Eggs broken	21	4
Eggs or chicks missing	5	4
Dead chicks	4	3
Nest upturned	6	1
Adult killed at nest	11	1
Total nests	97	17

Of the desertions, at least 21 Thrush and 2 Blackbird nests were already deserted when found, and no desertions are known to have resulted from human interference. Eight Thrush nests were probably deserted because of the snowfall on 7 November 1964 (one bird was seen incubating with an inch of snow on its back), and three nests had matagouri spikes penetrating the lining; several other spiked nests were deserted before laying. Eleven adult Thrushes and one Blackbird were killed at the nest, probably by stoats (*Mustela erminea*). A stoat was watched dragging a whole Thrush nest containing one egg to its den on 23 September 1964. Opossums (*Trichosurus vulpecula*) were common and may have contributed to the upturned nests, broken eggs and desertions. Three Australasian Harriers *(Circus approximans)* were often seen over the area, and a pair nesting in 1965 brought at least one Thrush to feed the young. They probably destroyed few nests, however, because these were generally well protected from above by thorny matagouri. No other predators were implicated: rats and mice are rare, cats are absent, and the area is too remote for human interference.

DISCUSSION

The most outstanding feature of the St. Arnaud nests is their extremely poor survival. Gurr (1954) drew attention to the higher nesting mortality of Blackbirds in New Zealand compared with Britain, and concluded "The nests studied all seem to have been prone to interference from humans, and probably this contributed to their consistent lack of success." The St. Arnaud area is practically free from human interference, yet the survival estimates of 7% to 16% for Thrushes and 14% to 17% for Blackbirds are lower than recorded by Bull (1946) at Auckland (22% and 30% respectively), and far lower than Snow's (1955b) estimates for Britain (29% to 47% and 33% to 42% respectively).

Some of the difference could be due to sampling bias or different methods of analysis. The New Zealand studies so far have been detailed and have covered small areas. It is possible that more failed nests are recorded in such conditions, as there may be a tendency amongst casual recorders to ignore deserted nests and reserve cards for those with a more interesting history. A detailed study of Blackbirds

at Oxford, however, revealed that far more nests survived in the town (50%) than in the neighbouring Wytham woods (14%) where predation by both bird and mammal predators was heavier (Snow, 1958).

Thrushes and Blackbirds in New Zealand face fewer species of predators than those in Britain; but this cuts both ways, and the predators may have fewer alternative foods. The main predators at St. Arnaud were stoats which probably hunt for nests by sight. This would make the nests in open matagouri especially vulnerable, although there was no indication that the few Thrush nests found high in beech trees fared any better. Certainly some nests must have more success, unless adult mortality is very low, for both species are abundant on the area and appear to be maintaining their numbers.

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SHORT NOTE

THE EGG OF THE LONG-TAILED CUCKOO

It is widely believed (Oliver, 1955, and Cunningham, N.Z.B.N. 3, 176, 1949) that Fulton was the first to describe the egg of the Long-tailed Cuckoo *(Eudynamis taitensis)* (Trans. N.Z. Inst., xxxvi, 1904). It is therefore of some interest that a rough description of the egg was given by Edward P. Ramsay in 1865 (On the Nests and Eggs of some New Zealand Birds, Ibis New Series April 1865, 1.2: 155). The following is a direct quotation from this.

The "Mocker" *(Anthornis melanura)* is frequently the foster parent of the Long-tailed Cuckoo *(Eudynamis taitensis,* G. R. Gray, *loc.cit.* p. 231) ("List of the Birds of New Zealand," contained in a former volume of the 'Ibis' (1862, pp. 214-253)). Of this latter bird, the eggs which Mr. Huntley sends — one from the nest of *Anthornis melanura,* and another from that of the Fan-tail Fly-catcher *(Rhipidura flabellifera)* — are of a pale yellowish salmon-colour, freckled indistinctly with marks of a deeper hue: they are 10 lines long by 7½ lines broad.

— J. M. CUNNINGHAM