

Notes on the Breeding of Varied Sittellas

Daphoenositta chrysoptera

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Two nests of Varied Sittellas *Daphoenositta chrysoptera* were watched near Moruya, New South Wales, for about 125 hours in 1982, one from laying of eggs to fledging of young and the other from the middle of incubation to fledging. Both incubation and nestling periods were 20 days. Though individual birds were not identifiable, probably the primary female alone incubated and brooded and the primary male brought most food to his sitting mate and to the young, as found by Noske (1980). Up to at least five other birds attended the nests, being most active in early morning and evening at one nest. None of these attendants was likely to have been the product of a previous brood in the 1982 season.

Introduction

The only detailed account of the breeding behaviour and social organisation of Varied Sittellas *Daphoenositta chrysoptera* is by Noske (1980). Observations that I made at two nests at Maulbrooks Road, Moruya, N.S.W., in 1982 support and supplement his findings.

The vegetation of the area is an association of Spotted Gums *Eucalyptus maculata* and Grey Ironbarks *E. paniculata* to 30-40 m tall, with some stringybarks, blackbutts, a few other eucalypt species and Rough-barked Apples *Angophora floribunda*.

Nest A was at 11.5 m in a Yellow Stringybark *E. muellerana*, just within reach of my viewing mirror. Though placed typically in a fork formed by three dead upright branches, it was unusually sited because it was partly screened by leafy twigs growing up from below. I found it on 24 September, already completely built; it was still empty on 26 September and had two eggs (full clutch) at 16:45* hours on 28 September. Both eggs hatched between 07:10 and 14:15 on 18 October and both young flew from the nest at about 09:10 hours on 7 November. Thus, if the laying of the second egg is taken as 06:00 hours on 28 September, the incubation period was 20 days $4\frac{1}{2}$ hours \pm $3\frac{1}{2}$ hours and the nestling period 19 days $23\frac{1}{2}$ hours \pm $3\frac{1}{2}$ hours.

Nest B was entirely exposed but inaccessible at 25 m in a fork of a small vertical dead branch of a Blackbutt *E. pilularis*. I found it on 22 October, which proved to be the eighth day of

incubation because the eggs hatched between 11:00 hours on 1 November (when young were not fed during 90 minutes) and 12:30 hours on 2 November (when they were). Three young left the nest between 06:00 and 09:30 hours on 21 November, a nestling period of 19 days 8 hours \pm $14\frac{1}{2}$ hours.

These nests were about 500 m apart and I noted no other sittellas in an area of 30-40 ha round them, which I often patrolled. From this, from the distribution of six nests in previous years and from the spasmodic records of the birds throughout the year for eight years, I judge that a breeding group occupies 15-20 ha in this habitat.

I watched both nests from a distance of 25-30 m, A from slightly below eye-level, B from well below. None of the attendants was individually marked and I could not distinguish differences in plumage at that distance usually against the light. Although I had clear views of both nests, my view in the tree-tops in the surrounding area was obscured by leaves in various directions and it was usually impossible to follow attendants far from the nests.

Results

Building

I did not see building at either nest. On 6 September 1980, however, I watched five birds collecting material from the tops of *Macrozamia* stumps near the ground and from branches high in the nesting tree; all individuals apparently brought material to the nest, which agrees with Noske's (1980) report. Near where Nest A was

* All times adjusted to Eastern Standard Time.

built, at least six birds were active about 17:00 hours each day from 16 September but unfortunately I did not watch them before I noticed the nest on 24 September. I did record that they indulged in wild chases through the trees and gained an impression that one pair of birds was mostly responsible.

Incubation

Tables 1, 2 and 3 summarise results of watches at both nests during incubation. Watches at Nest A were spread over 16 days (2-17 October), at Nest B over nine (23 October-1 November). I separated results into early-morning, middle-day and evening periods because experience at Nest A suggested that more attendants brought food early and late in the day than during middle hours. This indeed seemed so at Nest A where somewhat less time was occupied by incubation (Table 1), completed sessions on the nest and completed absences were longer (Table 2) and number and rate of feeding by attendants were less (Table 3) during the middle of the day than in early morning and evening. At Nest B only the number and rate of feeding conformed to this pattern but the sample was less representative of the whole period. Table 4 shows the number of attendants in addition to the sitting bird that I recorded during each watch. For one and two attendants I felt sure that no more were about simultaneously but for three or more I could not be sure that I always recorded the maximum.

The incubating bird at both nests was fed by attendants more often on or at the nest than away from it (i.e. more than 1 m distant, Table

3), though I must have missed some feeds away from the nest. On at least 25 occasions I noted attendants go to the unoccupied nest with food and then to the bird that had been incubating to feed it; once the attendant passed close to the incubator en route to the nest, visited the nest and followed the incubator to feed it. I noted no bird replace another on the nest, though once at Nest B a bird that I thought was not the one that had previously been incubating momentarily settled on the nest. Beside the many times when the incubator briefly left the nest for short distances and returned, I was able to follow it 11 times during intermissions of several minutes from leaving the nest to its return. It also repeatedly (20 times) returned to the nest unaccompanied after long intermissions. These observations left me in little doubt that only one bird incubated, as Noske (1980) showed; doubtless this was the primary female. Moreover, though I could not quantify observations, the incubating bird showed idiosyncratic behaviour when it returned to the nest; at Nest B it usually approached from below the nest along one or two routes whereas the attendants usually approached from above. As Noske noted, rapid quivering of the wings by the incubating bird occurred almost always when it was fed on or off the nest; once or twice this developed into waving of the wings when off the nest. I did not associate this with any other attendant except when mobbing potential predators. For instance, a pair of Grey Shrike-thrushes *Colluricincla harmonica* came into Nest A tree during five of my watches when a group of attendants was about; the sittellas immediately stopped feeding the sitting bird and gathered round the shrike-thrushes, hopping about, waving their wings to display the chestnut patches and often hanging head downwards until they had escorted the shrike-thrushes away from the nest. Once a shrike-thrush came right to the nest; then there was a tremendous flurry of five or six sittellas close round it and it quickly left without causing damage.

Attendants usually came into the nesting tree bearing food. Once in the tree, they foraged in it after feeding the sitting bird but were just as likely to forage in neighbouring trees more than 15-20 m away. At Nest B they rarely foraged within 15 m of the nest, probably because the nesting tree was a Blackbutt with smooth bark in its upper parts; there were also some smooth-barked Spotted Gums near it, so that the birds

TABLE 1

Time (minutes) spent incubating by Varied Sittellas.

	Total watch	Time on nest (%)
Nest A		
Before 07:00	470	335 (75.5)
08:30-16:00	1 174	812 (69.1)
After 16:00	580	473 (81.5)
Total	2 224	1 620 (73.7)
Nest B		
Before 07:00	420	231 (55.0)
08:30-16:00	757	445 (58.8)
After 16:00	80	63 (78.8)
Total	1 257	739 (58.8)

TABLE 2

Completed sessions of incubation and absence from the nest
by Varied Sittellas (time in minutes).

	N	Sessions on nest Range	Average	N	Absences Range	Average
Nest A						
Before 07:00	9	3-31 (59)*	16.3	13	1-15 (37)*	3.8
08:30-16:00	14	13-55 (67)	28.6	22	1-35 (38)	10.5
After	34	1-47	7.4	38	1-11	2.8
Total	57	1-55	14.1	73	1-35	5.3
Nest B						
Before 07:00	7	2-52	23.4	7	1-36	10.3
08:30-16:00	18	1-56 (58)	19.4	17	1-34 (60)	11.5
After 16:00	3	3-32	16.0	4	1-8	4.2
Total	28	1-56	20.0	28	1-36	10.2

* Number in brackets = length of longest uncompleted session, if longer than any completed session.

TABLE 3

Rates of feeding of incubating female by Varied Sittellas

	Time (mins) on nest	on/at nest	Feeds off nest	per hour
Nest A				
Before 07:00	335	34	5	7
08:30-16:00	812	20	13	2
After 16:00	473	54	24	8
Total	1 620	108	42	5½
Nest B				
Before 07:00	231	55	4	15
08:30-16:00	445	33	8	6
After 16:00	63	7	0	7
Total	739	95	12	8½

had to collect food in Ironbarks and stringybarks farther away, it being their habit to forage only on dead branches or on rough-barked trees. At Nest A there were few smooth-barked trees nearby but the birds by no means foraged only in the nesting tree.

Nestling period

At Nest A the amount of brooding fell off rather irregularly from about 75% to about 10% on the fourteenth day after hatching; I recorded no brooding later except on the eighteenth day when it was hot and sunny and the female sheltered the young for about 15 minutes at 11:00 hours; she also attended the nest for long periods when it was windy during the last four

TABLE 4

Number of attendants in addition to the incubating or brooding bird noted during watches at nests of Varied Sittellas.

	No. of watches (mins)	Attendants				
		1	2	3	4	5
Nest A						
Before 07:30	7 (470)	1	3	1	1	1
07:30-16:00	14 (1 014)	7	6	—	1	—
After 16:00	7 (580)	—	—	—	2	5
Nest B						
Before 07:30	4 (330)	—	—	—	3	1
07:30-16:00	8 (757)	2	3	2	1	—
After 16:00	1 (80)	—	—	—	1	—

TABLE 5

Number of feeds, rate of feeding and intervals between feeds at nests of Varied Sittellas during the nestling period.

	Nest A				Nest B			
	Before 07:30	07:30 16:00	After 16:00	Total	Before 07:30	07:30 16:00	After 16:00	Total
Watch (mins)	530	989	585	2 104	474	1 265	165	1 904
♀ Accepted	12	1	24	37	8	—	—	8
♀ Gave to yg	3	4	20	27	5	—	2	7
To yg direct	103	128	127	358	238	306	63	607
Total feeds	118	133	171	422	251	306	65	622
Feeds per hr.	13	8	15	12	30	15	24	20
Intervals Between feeds								
≤ 1 min	80(69)*	59(52)	93(61)	232(61)	168(73)	155(56)	38(60)	361(63)
1-5 mins	22(19)	24(21)	44(29)	90(23)	45(20)	73(26)	16(25)	134(23)
> 5 mins	15(12)	30(72)	16(10)	61(16)	16(7)	51(18)	9(14)	76(13)
Total	117	113	153	383	229	279	63	571

* Numbers on brackets = percentage.

days of the nestling period, without actually brooding. She probably left the nest about sunrise (e.g. at 05:23 on 19 October) and settled for the night between 17:53 and 18:07 but on 30 October when it was extremely dull she settled at 17:39. She did not cover the young at night from the sixteenth night. At Nest B brooding also fell off irregularly from about 60% to about 35% on the eighth day and to only 2% on the ninth after hatching and stopped thereafter. Brooding at night also stopped on the sixteenth day but the female had left the nest between 04:46 and 04:51 on six days before then and settled for the night at 18:24 and 18:40 on two. The difference in amount of brooding at the two nests may have been because the size of broods differed; differences in the weather at the appropriate times were negligible. After the female at Nest A gave up brooding at night she flew right away with the rest of the attendants about sunset and I supposed that they all roosted more than 50 m from the nest.

Numbers of feeding visits and rates of feeding are given in Table 5. While the female continued to brood, she accepted some of the food for herself but more often at Nest A than at Nest B; she also took the food and passed it on to the young more often at A than at B. On the other hand more feeding visits in total were made at B than at A so that the average rate of feeds there was 20 per hour compared with 12 per hour at A, perhaps because the brood was larger. Rate of feeding during the middle of the day was only about one half that of morning and

evening (Table 5). In fact, feeding was not at a uniform rate but occurred in bursts; the intervals between such bursts of activity were longer and more frequent in the middle of the day than early and late. When groups of attendants were active, four or five feeds were given in one minute but, when only one or two birds were in attendance, the usual rate was one feed every one or two minutes.

Behaviour of attendants when feeding nestlings was much the same as when feeding the incubating female. At Nest B they certainly foraged out of my view 50 m or more from the nest. Like Noske (1980), I noted (25 times) that some attendants came to the nest without food or with food that was not delivered to the young. Twice I noticed that all (4 and 5) attendants in the nesting tree froze for two and five minutes before they resumed foraging or flew away. Faecal sacs were carried away from the nest and then swallowed or dropped, so regularly that I assumed that any attendant would do so. Throughout the nestling period the brooding bird became more and more inclined to hop off the nest and spend periods (10-45 minutes), head downwards, probing into the outside or base of the nest or investigating the supporting branches; while she was doing this, other birds often came to feed the young but were ignored. On the ninth day after hatching at Nest B, I once saw the assumed primary female aggressively chase another bird of the attendant group away from the nest.

The nestlings were first visible over the rim of the nest on the eighth day after hatching at Nest A and on the ninth at Nest B. They began to flap their wings from the fourteenth and fifteenth days respectively. At Nest A during their eighteenth and nineteenth days both young were very active, climbing out of the nest, flapping, stretching and preening. They were similarly active early on the twentieth day but settled down in the nest every now and then. At 09:07 after a feed both hopped up the supporting branches and one flew away; I could not follow it; the other returned to the nest till 09:12, when it too flew away. I saw neither again. At Nest B at least one nestling became active on the seventeenth day after hatching, hopping out of the nest as far as the short supporting branches allowed; on the eighteenth all three young were active. At 09:15 one flew a short distance to a dead branch but soon returned to the nest; at 10:35 two flew strongly from the nest for 10-15 m into another tree; the third remained in the nest and settled down; at 13:15 two nestlings were again in the nest and next morning all three were in the nest at 05:00 and very active till 06:00; they had all left by 09:40 and I could not find them nearby nor did I see them again.

Conclusion

Among small passerines, incubation and nestling periods of 18 days or more are typical of species that nest in holes or make domed nests (e.g. for Australian passerines, gerygones, thornbills, treecreepers (Marchant 1980)) and not of those that build open cup-shaped nests. It seems exceptional that such a small species as the Varied Sittella should have both periods lasting about 20 days. Why the eggs take so long to develop can probably be explained only when more is known of the physiology and social organisation of the birds. The long nestling period is more easily explained because the habits of the birds and the situations of their nests demand that the young are well grown and able to fly well when they leave the nest, unlike the young of whistlers, yellow robins and whipbirds that leave the nest when partly grown and hide in undergrowth (pers. obs.). Noske (1980) noted a brood that might have fledged somewhat sooner than 19-20 days but his account of a ruined nest, of finding only two of three fledglings and of catching one in a butterfly net suggests to me that a predator had attacked the nest the night

before, had killed one nestling and ruined the nest but that two young had managed to escape. I doubt whether any of the young that I saw fledged could later have been caught.

My interpretation of the co-operative organisation at the nests that I watched is that the primary female alone incubated and brooded, that the primary male (sometimes with one other attendant) did most of the feeding of female and young from 07:30 to 16:00 hours and that a group of two to four other attendants took part in the early morning and late evening. This was less clear at Nest B than at Nest A, perhaps because the first had more young. In general this differs little from what Noske (1980) discovered and, because none of my birds could be recognised individually, there is no point in speculating about ages of the various attendants and their relationships. However, the groups of attendants at my nests in morning and evening seemed to vary in numbers and this made me wonder whether such groups formed a roving band of birds that drifted through the woods, split up and came together again and may even have visited more than one nest.

Probably none of the attendants at my nests was the product of a previous brood in the 1982 breeding season. For either primary pair to have had a successful nest earlier in the season would have meant that it had been started about 18 and 31 July, if one allows 10 days for building, 41 for laying, incubation and nestling periods, and seven days between fledging and rebuilding. This would have been one and a half to two months earlier than the earliest of five nests found at Moruya in previous seasons and unlikely in 1982 when the start of breeding by all other species was delayed by up to one month because it was so dry. I think that all attendants at my nests must have been at least nine months old.

The way in which the young at Nest B left and returned to the nest seems remarkable because in my experience this rarely happens among passerines except in some swallows.

References

- Marchant, S. (1980), 'Incubation and nestling periods of some Australian birds', *Corella* 4: 30-32.
Noske, R. A. (1980), 'Co-operative breeding and plumage variation in the Orange-winged (Varied) Sittella', *Corella* 4: 45-53.

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