

## DELAYED INCUBATION IN THE BLACK-CAPPED CHICKADEE (*POECILE ATRICAPILLUS*)

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**Abstract** -- A pair of Black-capped Chickadees undertook nesting in early July, late in the local breeding season of this species, in a suburban garden in Surrey, southwestern British Columbia. Two eggs hatched after a delayed incubation of 17-20 days, four to seven days longer than normal. Delayed incubation is discussed. The two young fledged during the afternoon, an unusual time of day.

**Key words:** Black-capped Chickadee, delayed incubation, *Poecile atricapillus*, southwestern British Columbia.

The Black-capped Chickadee (*Poecile atricapillus*) nests in a cavity dug by the pair in a rotten tree stub, but will also use abandoned woodpecker holes, natural cavities, or nesting boxes. Both sexes excavate a cavity, but the female constructs the nest, normally in three to four days (Bent 1946), with known extremes of two days to two weeks (Smith 1993). Upon completion of the nest, she may pause for a day or so before commencing egg-laying. She then lays one egg per day, usually early in the morning, until the clutch is complete (Odum 1941; Kluver 1961). Clutch size in British Columbia ranges from one to nine eggs, usually five to seven (Campbell *et al.* 1997). Incubation is solely by the female, although some males develop a partial brood patch (Odum 1941; Kluver 1961; Smith 1991, 1993). Incubation usually lasts 12-13 days, possibly rarely as short as 11 days (Peck and James 1987). The young leave the nest after another 16-18 days, usually early in the day (Odum 1941). The purpose of this note is to describe an instance of delayed (i.e., longer than usual) incubation in Black-capped Chickadees.

### OBSERVATIONS

In mid-May 1995, I observed a pair of Black-capped Chickadees inspecting nesting boxes in a moderately well-treed suburban garden in Surrey, southwestern British Columbia (49° 3'N, 122° 48'W). On 22 May, a female was noted carrying moss into one of the boxes. Three eggs were in the nest on 9 June. The outcome of this nesting is not known.

On 2 July, two eggs were felt lying deep in the nest material in the same box. Two adults were observed entering and leaving the nest box on 13 July. One remained in the box 20 minutes before departing, behaviour indicating that incubation was probably taking place (Odum 1941; Smith 1993).

Both adults were delivering food to the box and removing fecal sacs on 27 July. On 1 August, one well-feathered nestling crouched motionless in a depression in the nesting material immediately adjacent to the open side. I could not see farther into the nest chamber, and I did not reach in to

ascertain the presence of additional nestlings, as the intrusion might cause the visible nestling to burst out prematurely (Smith 1993). On 5 August, voices of two nestlings could be distinguished giving "dee" calls, one loudly enough to be heard 8 m. away. During an observation period of several minutes, one adult foraged in a honeysuckle vine (*Lonicera periclymenum*) 3 m. from the box, and delivered unidentified food at 10-second intervals.

On 6 August, a cold (12° recorded in the yard of the nest-site), windy, wet (19 mm. of rain in Greater Vancouver area) day (Climate Information, Environment Canada, Vancouver, personal communication), one nestling was observed at the box entrance, putting its head out and calling loudly. No adults were noted during the observation period from 11:00 to 12:00, nor at any time that morning. "Looking out" behaviour of the nestlings indicates that fledging will take place within "a few days" (Smith 1991, 1993). The nestlings were still in the box at 13:00. No more observations were made until 15:00, when I noted that the young had fledged, later in the day than normal (Odum 1941; Smith 1993). Two chick voices were heard calling loudly from dense trees 11-12 m. from the nest box, but they were not seen. The next morning, no voices were heard.

A close inspection of the well-constructed nest on 13 August revealed one unhatched intact egg remaining near the bottom of the nest material.

Approximate hatching date(s) of the two eggs that produced young can be calculated by backdating from the known fledging date of 6 August. A normal nestling period of 16-18 days indicates that the chicks must have hatched between 19 and 21 July. Since incubation normally begins with the penultimate egg in this species (Smith 1991, 1993), incubation should have begun on 1 or 2 July, depending on whether or not the third egg was already present when the nest was checked on 2 July. This gives an incubation period of 17-20 days, indicating that incubation was delayed or prolonged 4 to 7 days beyond the normal 12-13 days. Kluver (1961) observed a prolonged incubation period of 15 days in a Black-capped Chickadee nest, and Peck and James (1987)

reported an instance of a 17-day incubation period at one nest. Her brood patch may not have been fully in contact with the eggs.

## DISCUSSION

I do not know whether this was a true second brood (rare in Black-capped Chickadees -Smith 1993) or simply a replacement clutch. The early July laying date is near the late extreme of 12 July known for British Columbia (Campbell *et al.* 1997). There was no evidence in or near the nest box of additional eggs that may have been predated or carried off.

The extended incubation period could have been due to a single period of egg neglect, faulty incubation behaviour or a combination of these factors. The cause of the incubation delay may have been due to the female's brood patch not being fully developed, resulting in insufficient heat transfer to the eggs. Chickadees often cover their eggs with nest material before leaving the nest, both during the laying period and sometimes during incubation (Odum 1941; Smith 1991). Further, incubating females are quite active on the nest, "frequently fidgeting with the eggs" (Perrins 1979; Smith 1991). The third egg, if present on 2 July, may have been worked so deeply into the nest that sufficient warmth did not reach it, or it may have been infertile, possibly left over from the earlier nesting.

In Kluyver's (1961) case of a 15-day incubation period, the nest box was unusually large (70 cm.<sup>2</sup> bottom area), and the nest loose. The nest cup enlarged during incubation, allowing the eggs to sink and scatter, precluding normal incubation. Three of the seven eggs hatched, but two days longer than usual. Our box presented no such problem.

Haftorn (1988) showed that under certain adverse weather conditions, an incubating female may desert her clutch for several hours at a stretch, and suggested that this is normal behaviour in small passerines. During the incubation period in question (about 1-21 July 1995), the mean temperature was 2° above normal (as published in *Peace Arch News*); there was no precipitation (Climate Information, Environment Canada, Vancouver, personal communication). Consequently, weather was not a factor.

The incubation rate varies with the heat supplied by the incubating bird, and may be suspended for some time without injury to the embryo (Wing 1956). Delayed incubation is known to occur among species that forage on unpredictable resources long distances from their breeding colonies and have long incubation periods, particularly smaller Procellariiformes. In the Fork-tailed Storm-Petrel (*Oceanodroma furcata*), egg neglect is dramatic; the incubation period is between 37 and 68 days, with some embryos surviving up to seven continuous days of neglect and 23 days of intermittent neglect (Boersma *et al.* 1980; Simons 1981; Campbell *et al.* 1990; Astheimer 1991). The Cassin's

Auklet (*Ptychoramphus aleuticus*) has an average incubation period of 37.8 days, with a range of 37-42 days (Manuwal 1974; Campbell *et al.* 1990).

Delayed incubation of 42 days has also been documented for the Northern Goshawk (*Accipiter gentilis*) (Wallace and Mahan 1975), instead of the normal 35-38 days (Cramp 1980). Incubation in the Northern Bobwhite (*Colinus virginianus*) may be suspended for three weeks or more (Wing 1956).

Hatching time may vary considerably within a species, according to parental incubation, temperature of the nest or temperature of individual eggs within the nest (Ricklefs 1993), or by some combination of factors (Webb 1987). Some British tits delay incubation until several days after the clutch has been completed (Perrins 1979), especially in an early-season nesting (Gibb 1950). Ordinarily, in the Black-capped Chickadee, incubation begins with the laying of the penultimate egg in the clutch, but in a late-season nesting, incubation may begin some days earlier (Smith 1991, 1993).

During incubation, an egg loses weight due to loss of water vapour by diffusion through the shell (Rahn and Ar 1974). If incubation is delayed or prolonged too long, the embryo succumbs to desiccation. The likelihood of this is much reduced in cavity nesters due to the insulative value of the nest chamber and nest material. The chickadees' egg-covering behaviour when leaving the nest during laying and sometimes during incubation would further retain nest humidity, retarding water loss, and making it possible for the embryo to survive a 4-7 day delayed incubation.

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