Table 1. Records of Yellow-throated Bulbul *Pycnonotus xantholaemus* from Tamil Nadu (India)

Sl No.	Site	District	Location
1	Vallamalai Temple	Vellore	12°55'N 79°7'E
2	Gingi hills (Muttanadu Forest Range & Gingi Fort)	South Arcot	12°14'N 79°23'E
3	Chitteri Hills	Dharmapuri	11°49'N 78°28'E
4	Shevroy Hills (Yercaud)	Salem	11°47'N 78°12'E
5	Sankaridrug (Sankariurga)	Salem	11°00'N 76°58'E
6	Sirvani range (Siruvani)	Coimbatore	11°00'N 76°58'E
7	Monkey Falls (Indira Gandhi Wildlife Sanctuary)	Coimbatore	10°30'N 77°00'E
8	Mavinahalla (Mudumalai Wildlife Sanctuary)	Nilgiri	11°32'N 76°38'E
9	Pachamalai Hills (Manalodai Reserved Forest)	Tiruchirappalli	11° 15'N 78°30'E
10	Bodinayakanur	Theni	10°01'N 77°21'E
11	Lower Palani Hills	Madurai or Madura	09°49'N 77°49'E
12	Meghamalai Hills	Kambam	09°31'N–10°10'N 77°20'E–77°40'E

Source: http://www.birdlife.org. Extracted on 2006 [This work includes Mamandur forests and Penchalakona Hills of Andhra Pradesh state, within Tamil Nadu (p. 1970), which is an error and is therefore not included in the above table.]; Subramnian (2001); Rajaram (2005).

Notes on the breeding of Striolated Bunting *Emberiza striolata* near Pune, Maharashtra (India)

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(Photos by Satish Pande)

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Striolated Bunting *Emberiza striolata* is recorded in north-west India up to southern Uttar Pradesh (Etawah), central Madhya Pradesh (Sagar) and central Maharashtra (Daulatabad) (Ali & Ripley 1974). Pande et al. (2003) reported its occurrence in Maharashtra up to Sangli district. The darker upper mandible and yellow lower mandible of this bunting are diagnostic. Since the Striolated Buntings are distinctly dimorphic, the respective roles of both sexes in nidification can be correctly monitored. In this paper, we record the breeding of the Striolated Bunting in Maharashtra.

Status, occurrence and earlier nesting records from the study area

Striolated Buntings are resident in a small area in the Saswad environs near Pune (Maharashtra), inhabiting dry stony country where the vegetation is predominantly scrub, comprising of euphorbia and acacia species, intermingled with areas of cropland. They are present year round and are best seen at noon near water holes. Since 1991, we have recorded seven nests of these buntings near Saswad, Sonori, Dive and Bapdeo Ghat, all within 28 km of Pune and a few kilometers from one another.

Portrait of Striolated Bunting *Emberiza striolata*

Of the seven nests recorded, the birds abandoned three nests. The termites destroyed one, which was built on an active termite mound, even while the bunting was incubating and, red ants devoured the three eggs it contained. A Grey Shrike

Adult feeding young

Lanius meridionalis predated three eggs from one nest while a monitor lizard *Varanus bengalensis* dispatched another clutch of three from another nest. From the seventh nest, an unknown predator devoured all the chicks, soon after they hatched. All seven nests were unsuccessful.

Period of observation and ambient parameters during nesting period

A pair of Striolated Buntings was observed building a nest on 2.x.2005 near Saswad in Bapdeo Ghat (18°24'99''N 73°54'19''E), a winding uphill road, near Pune. We observed this nest closely from 2.x.2005–12.xi.2005. Twenty-five visits were made and 65 hours spent in observation. The timings of sunrise and sunset on 15.x.2005 (day of egg laying) and 11.xi.2005 (day of fledging) were 06:35 hrs and 18:14 hrs and, 06:46 hrs and 17:59 hrs respectively, with 11 hours 21 minutes to 11 hours 13 minutes of sunlight. In the early part of nesting a few spells of rain occurred. Mornings were foggy and cloudy and the day cold with temperatures ranging from 17°C–32°C in the early stage of nesting and 13°C–28°C in the later part.

Nest building

The nest had already been partially built when we first spotted it. The pair was very vocal. It was their song that attracted our attention.

The male and the female both brought about 4–5 cm long and up to 1.5 cm thick dry twigs in their beaks, to make the nest. Six to seven twigs were brought over 10–15 minutes, after which the buntings took a break for 15 minutes or more. The nest was completed on 3.x.2005. The nest was built by the roadside in a crevice 30 cm above the level of the road, under a shallow rock that jutted from the earth cutting. We counted an average of 38 vehicles (motorbikes, scooters, small tempos, vans, trucks and buses) passing on this road in one hour in the morning between 7:00–8:00 hrs, and within five feet of the nest. The buntings were quite oblivious of the traffic, which waned from noon. However, on 4.x.2005 the buntings abandoned the nest.

We observed them building a second nest by the roadside on 5– and 6.x.2005, about 70 m from the first location, in a shallow ledge of the earth cutting, about 120 cm above the level of the road. This nest was also abandoned on 7.x.2005. Since we could not spot any other Striolated Buntings at that location, we assumed that it was the same pair engaged in breeding activity. The pair did not visit the discarded nests again.

Construction of a third nest began on 8.x.2005, again by the roadside, at a distance of about 20 m from the second nest. This was completed on 10.x.2005. This time the pair was slightly less vocal than before. Again, both birds participated in nest building. The nest was on a ledge (380 mm x 390 mm), which was 120 cm above the level of the road, on a 'U' turn in an earth cutting. The untidy nest cup was 120 mm x 90 mm. It was 23 mm deep and was made of dry, thin as well as stout, short twigs, and was lined with soft grass inflorescence and a feather or two. A perfect overhang sheltered it from the top. Like the previous nests, this too faced north and did not receive direct sunlight at any time. There were brief spells of rain later, but the nest was so well protected that it remained dry.

Egg-laying, incubation and hatching

In all, three eggs were laid asynchronously, one every day, from 13–15.x.2005, between 07:05 hrs and 07:09 hrs. The hen flew away briefly after an egg was laid. The eggs weighed 2 g each and were 18 mm x 13.5 mm in size. They were oval, with one end narrow, grayish in colour, streaked, blotched and clouded with brown, more densely on the broad end. The size of 15 eggs, given by Ali & Ripley (1974) on the authority of Baker, was 20 mm x 15 mm.

Incubation began on 15.x.2005 after the third and final egg was laid. Only the female was seen to incubate. The male did not feed her at the nest and was rarely seen around the nest during incubation. The female sat low in the nest and the streaks on her crown and back offered excellent camouflage. Locating the bird on the nest was quite difficult even for those who knew the nest location. The female left the nest briefly after long spells of incubation lasting up to four hours. She incubated all night.

All eggs hatched synchronously on 28.x.2005. The incubation period lasted for 14 days. The female actually warmed the eggs for 329 hours, being inattentive only for seven hours, or 2% of the overall incubation period of 336 hours.

Nestlings and their brooding

The altricial nestlings, covered with grey natal down, appeared like balls of fur. Their eyes opened on the fourth day after

Regurgitating grain for young

Grain visible in crop of young

hatching. They were devoid of flight or tail feathers. The young were only brooded on the first day and were not fed. Both parents started feeding the nestlings from the second day. The male came to feed them after an average of every three visits of the female. The average feeding frequency was 28 min. All the chicks were fed at least three times whenever a parent arrived with food. The male was wary while approaching the nest but the female directly flew to the nestlings. During feeding, the parents were completely silent.

Feeding

The feeding of chicks by male and female parents was always by regurgitation of swallowed food. During the entire period, from hatching of eggs until fledging, the parents never visited the nest with food visibly held in the beak. This method may serve two purposes. One, the food may be already semi-digested and easier for the chicks to process. Two, predators are not attracted to the parents since they do not hold any visible prey in their beaks when they approach the nest. Still photography with zoom lenses and video-photography confirmed that up to the eighth day from hatching the feed consisted of only regurgitated seeds that may have been wet and sticky due to digestive fluid mixed from the parental gut.

Another confirmation of the diet was actual visualization of the seeds in the gut of the chicks, since the overlying skin that was taut over the distended crop after feeding was semi-transparent and revealed the seeds within their crop.

During the first four days, the parents sometimes swallowed the fecal sacs of the chicks. At other times, the fecal sacs were discarded away from the nest.

Striolated Buntings are usually graminivorous birds. A remarkable change in the diet given to the chicks was seen from the ninth day. Inspection of the semi-transparent skin of the chicks revealed the presence of green non-hairy caterpillars in their crop. Interestingly, the caterpillars were also fed by regurgitation. This transient and subtle switchover to insect diet is immensely helpful at the feathering stage of the chicks.

Serial biometry of chicks

On the fourth day from hatching all the three chicks weighed 2.5 g.

On the eighth day, they weighed 4 g. Their weights had doubled in eight days when they were fed only seeds.

On the twelfth day, after insect diet was started, the three chicks weighed 12 g, 12 g and 11.5 g. Their weights had tripled in just five days. On day twelve, the various biometric parameters of the three chicks were as follows:

Wing chord—52 mm, 53 mm and 50 mm. Tarsus—17 mm, 17 mm and 16 mm. Tail—25 mm, 25 mm and 24 mm. Beak—9 mm, 8 mm and 7 mm.

On day fourteen: Wing chord—52 mm, 53 mm and 50 mm. Tarsus—17 mm, 17 mm and 16 mm. Tail—28 mm, 27 mm and 26 mm. Beak—9 mm, 8 mm and 7 mm. Weight—13 g, 13 g and 11.5 g. Ten primary and ten tail feathers are present.

Adult birds have the following biometric parameters in mm. (Ali 1974, on the authority of Hugh Whistler): Size—140 mm. Wing chord: Male—73–85 mm; Female—72–80 mm; Tail: Male—56–65 mm; Female—56–63 mm. Bill from skull—11–13 mm; Tarsus—15–16 mm; Males are larger than females.

Fledging

All the three chicks fledged one by one on 12.xi.2005, from 07:00 hrs until 09:00 hrs. Both the parents induced them to come out of the nest by uttering special harsh and subdued calls. As soon as the chick left the nest, it was escorted to the nearest evergreen thicket and fed there. The chicks also uttered low volume chirps. The chicks took flight but were clumsy and unsteady on the wing but hopped effortlessly. They preferred to hop and in case of any unexpected movement stayed still relying on their cryptic coloration. One more observation that is interesting was that the droppings of the chicks until the day prior to fledging were encased in gelatinous fecal sacs, but from the day of fledging, the droppings were loose and not covered in fecal sacs and freely

Adult removing fecal sac

splashed hither and thither. Both parents did post-fledging feeding of the chicks but the chicks also started gleaning seeds by themselves a few hours after fledging. Observing the chicks after they took refuge in thick bushes was difficult. We did not pursue the observations since a Sirkeer Malkoha *Taccocua leschenaultii*[1] was seen near the nest and we feared that our scrutiny might draw the attention of this predator to the fledglings.

Biometric correlation with post-fledging behaviour

At the time of fledging, the chicks had assumed wing pattern like adults but some down persisted amidst the feathers, especially on the head and crown. The stripes on the crown were very faint. At fledging the beak and tarsus of the chicks had attained almost 100 % growth hence the excellent hopping ability. The wing chord and tail of the fledglings had attained 66.3 % and 46.7 % of adult size respectively, explaining their clumsy flight.

Conclusion

Breeding records and breeding biology of the Striolated Bunting from peninsular India are presented in this paper and are supported by photographs. Striolated Buntings may, as in the above case build multiple nests before finally laying the eggs. Nest is built by both sexes in three days. Eggs are laid in asynchronous manner, every 24 hours and three eggs

Mixed diet visible in crop of young

Caterpillar visible in crop of young

are usually laid, but hatching is synchronous on the same day, indicating that incubation begins after the last egg is laid. Female incubates alone. Clutch size of three was observed in three nests. Incubation period is 14 days and fledging period is 15 days. Seeds and grain constitute the initial diet of the chicks followed by a switch over to insects and grub from the eighth day when flight feathers develop. Feeding by both parents is by regurgitation. Overall nesting success is poor. Of the ten nesting attempts observed since 1991, five nests were abandoned before eggs were laid; all eggs were predated in three nests; nestlings were predated from one nest; one nest was 100% successful.

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[1] As per Rasmussen & Anderton (2005).