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EGG CHARACTERISTICS AND CLUTCH SIZE IN AN ENDEMIC AVIAN SPECIES, THE BROWN ROCK CHAT, IN HARIDWAR, INDIA

Vinaya Kumar Sethi, Amit Kumar, Dinesh Bhatt

Abstract. Out of nine species of genus *Cercomela* distributed primarily across the African continent (Muscicapidae), only one species, i.e. *C. fusca*, occurs in India. It is endemic to the Indian subcontinent and hence deserves importance from conservation point of view. Data have been gathered on egg characteristics and clutch size of the Brown Rock Chat during 2004 to 2006 in the urban and suburban areas of district Haridwar (29º N; Himalayan foothills of Uttarakhand state), India. Brown Rock Chat laid one egg per day. Weight of freshly laid eggs ranged from 2.42 to 2.57 g and averaged 2.49 ± 0.02 g (± SD). The length, breadth and volume of 100 eggs averaged 20.67 ± 0.25 mm, 15.84 ± 0.36 mm and 2.65 ± 0.14 cm^3 respectively. No significant variation occurred in average weight of successive eggs; however, average egg weight in individual clutches differed significantly among different females. Egg and clutch sizes did not differ among broods and breeding months. Three- and four-egg clutches were the only clutch sizes recorded during the present study. Clutch size averaged 3.4 ± 0.5 (± SD), more nests (60.3%) had three-egg clutches than four-eggs (39.7%).

Key words: Brown Rock Chat, *Cercomela fusca*, egg weight, egg size, clutch, brood.

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Характеристики яиц и величина кладки у эндемичного вида птиц, бурого скромного чекана, в Харидваре, Индия. - В.К. Сети, А. Кумар, Д. Бхатт. - Беркут. 19 (1-2). 2010. - Из 9 видов рода *Cercomela* (Muscicapidae) только один встречается в Индии, являясь эндемиком Индийского субконтинента. Исследования проводились в 2004–2006 гг. в г. Харидвар и его пригородах (штат Уттараханд). Бурый скромный чекан откладывает по 1 яйцу в день. Вес свежеснесенных яиц 2,49 ± 0,02 г (± SD; 2,42–2,57, n = 53). Длина, максимальный диаметр и объем 100 яиц составляли соответственно 20,67 ± 0,25 мм, 15,84 ± 0,36 мм и 2,65 ± 0,14 $см^3$. Вес последовательно отложенных яиц достоверно не отличался, но обнаружены достоверные различия среднего веса яиц в кладках разных самок. Размеры яиц и величина кладки не отличались для 1-й и 2-й кладок и для разных месяцев. Средний размер кладки 3,4 ± 0,5 яйца. 60,3% кладок имели по 3 яйца, 39,7% – по 4.

Introduction

Cercomela is a genus of small passerine birds of the Old World flycatcher family Muscicapidae. It comprises nine arid-adapted terrestrial bird species distributed primarily across the African continent with only one species i.e. Brown Rock Chat (*Cercomela fusca*) occurring in India.

The Brown Rock Chat is endemic to the central part of the Indian peninsula, north of the Narmada River, from Punjab (Pakistan) in the west through Punjab (India), Uttarakhand, Uttar Pradesh, Bihar to West Bengal, and in the western Himalayan foothills up to 1300 m (Ali, Ripley, 1998). So far the conservation status of this species is concerned, it falls under the 'least concern' category of IUCN (IUCN Red List, 2006). The call repertoire of this species has been well documented (Sethi, Bhatt, 2008). However, there appears a wide gap of information in the form of long term and systematic data on its breeding parameters/ behaviour except for few observations on its nesting habitat (Mathews, 1919; White, 1919) and range extension (Khacher, 2000).

In the light of this background, this paper attempts to gather information on the egg characteristics and clutch size of Brown Rock Chat in its natural habitat.

Material and methods

This investigation aimed to gather data across three breeding seasons of Brown Rock Chat during 2004 to 2006 in the urban and suburban areas of district Haridwar (29º N; Himalayan foothills of Uttarakhand state),

Brown Rock Chat lays one egg per day.
A nest with one egg on 11.06 morning (A), with two eggs on 12.06 morning (B) and with three eggs on 13.06 morning (2005).
Бурый скромный чекан откладывает по одному яйцу в день.

India. Study area was composed of mainly residential colonies of concrete houses, streets, roads, home-gardens etc.

Field visits were carried out to monitor nests in most parts of the day almost on alternate days or as required during the breeding season of this species (March to June). Eggs were measured and weighed within 24 hrs of laying. Eggs' volume was calculated as 0.51 x length x (breadth)^2 following Hoyt (1979). Clutch size was defined as the number of eggs laid by a female in single breeding attempt. Egg size was compared in relation to brood number (I vs. II) and breeding months (early vs. mid vs. late) to understand their effects. Breeding months were divided into three phases: early (February – April), mid (May – June) and late (July – August).

Data were analyzed with standard statistical tests such as two tailed *t*-test and one-way ANOVA (Zar, 1999).

Table 1

Weight of eggs of Brown Rock Chat
Вес яиц бурого скромного чекана

Year	Nest No.	Weight of eggs				Mean ± SD
		Ist egg	IInd egg	IIIrd egg	IVth egg	
2004	A04	2.51	2.50	2.47	2.48	2.49 ± 0.01
	C04	2.53	2.49	2.51	–	2.51 ± 0.02
	E04a	2.49	2.52	2.47	–	2.49 ± 0.02
	E04b	2.50	2.48	2.50	–	2.49 ± 0.01
	O04	2.53	2.49	2.52	2.48	2.50 ± 0.02
	R04a	2.48	2.53	2.51	–	2.50 ± 0.02
2005	B05	2.48	2.42	2.47	2.47	2.46 ± 0.02
	D05a	2.51	2.48	2.49	–	2.49 ± 0.01
	D05b	2.50	2.51	2.49	–	2.50 ± 0.01
	L05	2.49	2.52	2.52	2.51	2.51 ± 0.01
2006	D06a	2.47	2.48	2.46	2.49	2.47 ± 0.01
	D06b	2.48	2.50	2.47	2.48	2.48 ± 0.01
	I06	2.48	2.46	2.45	–	2.46 ± 0.01
	N06	2.57	2.56	2.54	2.56	2.55 ± 0.01
	V06	2.49	2.48	2.47	2.46	2.47 ± 0.01
Average		**2.50**	**2.49**	**2.48**	**2.49**	**2.49 ± 0.02**
SD		**0.02**	**0.03**	**0.02**	**0.03**	**(n=53)**
Difference among successive eggs: F = 0.419, df = 3, 49, P > 0.05						
Difference among different females: F = 6.665, df = 14, 38, P < 0.05						

Table 2

Egg characteristics of Brown Rock Chat (n = 100)
Параметры яиц бурого скромного чекана

Parameter	Mean ± SD	Range
Length (mm)	20.67 ± 0.25	20.10–21.10
Breadth (mm)	15.84 ± 0.36	15.56–16.83
Volume (cm^3)	2.65 ± 0.14	2.50–3.02

Results and discussion

Brown Rock Chat laid one egg per day (Fig.). Similarly, a number of other avian species also lay eggs at 24 hours interval (Beason, Franks, 1974; Aguon, Conant, 1994; Prather, Cruz, 1995; Dhanda, Dhindsa, 1998; Kumar, 1999; Kumar et al., 1999). In Rufous Horneros (*Furnarius rufus*) (Fraga, 1980) and Brown Cachalote (*Pseudoseisura lophotes*) (Nores, Nores, 1994), however, usual laying interval is of two days. In addition, we found many nests under construction from which we ascertained the interval between nest completion and laying of first egg. The bird took gap of 1 to 5 days between the nest completion and laying of the first egg (latency period) (n = 24). However, in some cases female laid the first egg immediately after the nest completion (n = 9). The mean values of latency period averaged (± SD) 1.5 ± 1.3 days. The longest recorded latency periods were 4, 3 and 5 days in 2004, 2005 and 2006 respectively. Brown Rock Chat, like most other species, did not lay eggs until the nest was complete. However, there are species that lay eggs even before the nest completion (Natarajan, 1997).

Egg characteristics

The eggs of Brown Rock Chat were pale blue and oval in shape with rusty spots and one end large and the other relatively pointed. The colour turned slightly dull near hatching. Weight of freshly laid eggs ranged from 2.42 to 2.57 g and averaged 2.49 ± 0.02 g (± SD, n = 53; Table 1). The length, breadth and volume of 100 eggs averaged 20.67 ± 0.25 mm, 15.84 ± 0.36 mm and 2.65 ± 0.14 cm^3 respectively (Table 2). Baker (1934) also observed nearly similar values of egg length (20.5 mm) and egg breadth (15.5 mm) for Brown Rock Chat. However, for egg weight and volume no previous information seems available for comparison for this species.

Egg weight of birds has been presumed to be an important characteristic for predicting various parameters like metabolic rate (Rahn et al., 1975), incubation period (Rahn, Ar, 1974), water vapour conductance (Ar et al., 1974), the daily rate of water loss (Drent, 1970), surface area, density and shell weight (Paganelli et al., 1974), the relation of egg weight to adult body weight (Rahn et al., 1975). In Brown Rock Chat no significant variation occurred in average weight of successive eggs ($F = 0.419$, $df = 3, 49$, $P > 0.05$; Table 1). However, average egg weight in individual clutches differed significantly among different females ($F = 6.665$ $df = 14,38$, $P < 0.05$; Table 1). This difference in average egg weight among individual clutches was possibly due to difference in the age or body condition of the laying female.

Table 3

Egg parameters of Brown Rock Chat in relation to brood number
Параметры яиц бурого скромного чекана 1-го и 2-го выводков

Parameters	Brood number		Difference between broods
	First (n = 22)	Second (n = 8)	
Length (mm)	20.68 ± 0.24	20.67 ± 0.28	$t = 0.09$, $df = 11$, $P > 0.05$
Breadth (mm)	15.88 ± 0.41	15.74 ± 0.14	$t = 1.30$, $df = 28$, $P > 0.05$
Volume (cm^3)	2.65 ± 0.16	2.60 ± 0.07	$t = 1.12$, $df = 25$, $P > 0.05$

Table 4

Egg parameters of Brown Rock Chat in relation to egg laying sequence (± SD)
Параметры яиц бурого скромного чекана по порядку откладки

Egg sequence in clutch	Sample size	Length (mm)	Breadth (mm)	Volume (cm^3)
First egg	30	20.67 ± 0.29	15.86 ± 0.37	2.65 ± 0.15
Second egg	30	20.70 ± 0.29	15.90 ± 0.37	2.65 ± 0.14
Third egg	30	20.67 ± 0.25	15.84 ± 0.36	2.64 ± 0.14
Fourth egg	10	20.60 ± 0.19	15.66 ± 0.17	2.57 ± 0.07
Difference: F-value (df = 3, 96)		0.112 P > 0.05	0.887 P > 0.05	0.788 P > 0.05

Egg size in relation to brood number, laying sequence and breeding months

Data on egg size in first and second broods revealed a non-significant variation between broods for all the parameters (Table 3). This was because the laying female was same in both the broods. Egg-size parameters were also studied according to the sequence in which eggs were laid and successive eggs of the clutches did not differ significantly in size (Table 4). Similar results have been found also for White-rumped Shama (*Copsychus malabaricus*) (Aguon, Conant, 1994) and Common Myna (*Acridotheres tristis*) (Dhanda, Dhindsa, 1998). In other species, however, egg volume may increase (Least Flycatcher (*Empidonax minimus*); Briskie, Sealy, 1990) or decrease (American Crow (*Corvus brachyrhynchos*); Ignatiuk, Clark, 1991) with laying sequence. We did not observe any significant variation in size of eggs laid in early, mid and late breeding months (Table 5). Food supply in the form of insects was apparently similar and abundant among the breeding months for Brown Rock Chat that in turn probably did not affect the egg characteristics among breeding months.

Clutch size

A total of 73 clutches were observed during 2004–2006. Three- and four-egg clutches were the only clutch sizes recorded during the present study. Nests with three-egg clutches were 12 (57.1%) in 2004, 16 (64.0%) in 2005 and 16 (59.3%) in 2006 while nests containing four-egg clutches were observed 9 (42.9%) in 2004, 9 (36.0%) in 2005 and 11 (40.7%) in 2006. On pooling three-year data, more nests (60.3% or 44 nests) had three-egg clutches than four-egg clutches (39.7% or 29 nests). Clutch size averaged 3.4 ± 0.5 (± SD; n = 73).

Clutch size in relation to brood number and breeding months

It has been suggested that females might be in better body conditions at the time of first

Table 5

Egg parameters of Brown Rock Chat in relation to breeding months (± SD)
Параметры яиц бурого скромного чекана по месяцам гнездования

Parameters	Early (n = 16)	Mid (n = 13)	Late (n = 3)	Difference (df = 2, 29)	
				F	P
Length (mm)	20.71 ± 0.24	20.64 ± 0.26	20.71 ± 0.18	0.266	P > 0.05
Breadth (mm)	15.75 ± 0.14	15.97 ± 0.51	15.62 ± 0.06	2.064	P > 0.05
Volume (cm^3)	2.61 ± 0.06	2.68 ± 0.20	2.55 ± 0.02	1.507	P > 0.05

Table 6

Clutch size of Brown Rock Chat in relation to breeding months
Величина кладки бурого скромного чекана по месяцам гнездования

Breeding months	Nests	Mean ± SD
Early	26	3.50 ± 0.50
Mid	41	3.31 ± 0.47
Late	6	3.50 ± 0.54
Difference among breeding months (ANOVA)		F = 1.24, df = 2, 70, P > 0.05

brood than the time of second or third broods; as a result successive clutches might be smaller than the earlier ones (Dhanda, Dhindsa, 1998). However, in Brown Rock Chat all the females those laid second clutches, laid the same number of eggs as of first clutches. Hence brood number had no effect on clutch size. On the other hand, clutch size varied in relation to brood numbers in some species such as White-rumped Shama (Aguon, Conant, 1994) and Common Myna (Dhanda, Dhindsa, 1998). Clutch size of Brown Rock Chat did not differ significantly among breeding months also (F = 1.24, df = 2, 70, P > 0.05; Table 6). This could again be due to almost equal availability of food supply throughout the breeding month. However, seasonal decline in clutch size has been reported in Song Sparrow (*Melospiza melodia*) (Hochachka, 1990). While Treecreepers (*Certhia familiaris*) lay largest clutches in the middle of the breeding seasons (Kuitunen, Aleknonis, 1992).

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НОВА ЗНАХІДКА ВЕЛИКОГО КРОХАЛЯ В КАРПАТАХ

New record of the Goosander in the Carpathians. - V.N. Grishchenko, E.D. Yablonovska-Grishchenko. - Berkut. 19 (1-2). - Goosander is a very rare breeding species in West Ukraine. A female with 5 chicks were observed on the Rika river near the village of Vuchkove [48.27 N, 23.33 E] on 16.06.2010. [Ukrainian].

Великий крохаль (*Mergus merganser*) – в Україні досить звичайний вид під час міграцій і на зимівлі, на гніздуванні ж зустрічається вкрай рідко і лише в західних областях. В Українських Карпатах його виявляли на гніздуванні всього кілька разів. 1.05.1926 р. на р. Уж біля с. Сторожниця (нині Ужгородський р-н) на Закарпатті була здобута пара, самка з якої вже почала насиджування яєць (Грабар, 1997). А.М. Полуда (1991) виявив гніздове угруповання великих крохалів у районі Вільшанського водосховища на р. Теребля в Закарпатській обл. 16.07.1987 р. тут спостерігався виводок з 13 пташенят і самки. В.В. Бучко (1998) знайшов цей вид на гніздуванні в Передкарпатті – в 1986 р. самка, яка насиджувала кладку, виявлена на р. Лімниця поблизу с. Блюдники Галицького р-ну Івано-Франківської обл.

16.06.2010 р. на Ріці біля с. Вучкове Міжгірського р-ну Закарпатської обл. нами спостерігався виводок із 5 пташенят і самки (фото). Птахи трималися серед каміння біля берегів річки. Це місце знаходиться неподалік від водойми, на якій крохалі були виявлені раніше. Очевидно, в центральній частині Українських Карпат існує постійний осередок гніздування цього виду.

Виводок великого крохаля. Ріка біля с. Вучкове. 16.06.2010 р. Фото В.М. Грищенка.
A brood of the Goosander on the Rika river.

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