Journal of Biodiversity and Environmental Sciences (JBES)
ISSN: 2220-6663 (Print) 2222-3045 (Online)
Vol. 5, No. 2, p. 296-305, 2014
http://www.innspub.net

RESEARCH PAPER OPEN ACCESS

Spatial distribution and nidification record of Himalayan Monal and Koklass Pheasants in Kalam district Swat, KP, Pakistan.

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Article published on August 11, 2014

Key words: Spatial distribution, Nidification, Himalayan Monal, Koklass.

Abstract

Himalayan Monal and Koklass were observed from three selected sites (Batandar, Anakar and Janshai) in winter about 7900ft and 7500ft and in summer 12381ft and 10108ft from the sea level respectively. The altitudinal migration of Himalayan Monal and Koklass from lower to upper elevated zones was the result of human activities and livestock grazing in summer season while their downward migration was the result of heavy snowfall in their natural habitats. The first nidification record was also observed in kalam valley during the study sites where three nests were detected one of Monal pheasant and two of Koklass pheasant. The Koklass nests were present on the ground at batandar (8620ft), and Janshai (9305ft) while the only nest of Himalayan Monal was observed in Janshai (9447ft). The nesting behavior of Koklass was professionally like other birds but on the ground while the Monal nest was just like a temporary scrapes on the ground. Concluding from the study work that nests of these pheasants are mostly affected from local residents in early summer and foraging mostly from livestock. Awareness and education to the local villagers will help in conservation of habitats. The strict action of wildlife staff against poachers and illegal hunters will also be helpful for the conservation of these pheasants.

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Introduction

Birds are of great economic importance to the human society. They play an important role in controlling population of different insects and pests. They play the role of scavengers and pollinating agents and also help's in dispersal of seeds of different vegetations. They are helpful and help to provide rich food for mankind and are known to man since ages (Chittampalli and Bhatkhande, 1993). The variety of avian species in ecosystems reflects the well being of its habitat. Birds are the indicators of environment and are being used for conservation and environmental impact assessment (Gregory *et al.,* 2003).

Pakistan harbors a wide range of ecosystems which in turn catches the attention of a diverse avifauna to exploit their resources (Khan *et al.,* 1996). More than 650 species of birds have been reported in the country and their occurrence in three zoogeographical zones (Oriental, Palaearctic and Ethopian region) is unique in the world (Grimmett *et al.,* 2001; Mirza and Wasiq, 2007).

The Himalayan Monal occupies range between 2400m to 4000m and as low as 2000m in winter (Ramesh *et al.,* 1999). Koklass reaches an altitude range, between 2,200m and 2500m, during winter and summer migrations. In winter Koklass mostly desire habitats which are snow free (Gaston *et al.,* 1981; Roberts, 1991).

Nesting is mainly starting in the May up to the last week of June reported from India and NWFP (Gaston *et al.,* 1981). In Afghanistan and Tibet it is reported that the season extends up to July (Ridley 1986, Gaston *et al.,* 1981). Mostly they built nests at an altitude ranging from 2300m to 2700m, in wooded habitats particularly in bushes, tree hole or a rock having less under growth (Zaman, 2008). Females usually take the major part in chick rearing but males have also been reported to rear young ones (Robert, 1991). The incubation period for Monal is between 26-29 days. In captivity, females lay another clutch when the first is removed or unsuccessful (Howman, 1993). In India, the breeding period of Koklass lasts from April to June (Ali and Ripley, 1978; Baker, 1930). However, in Kashmir and Khyber Pukhtunkhwa eggs have been found in nests as late as 15 July. These birds build nests early and lay eggs in mid-May through June. Thick bushes and water resource sites are commonly selected for nesting sites (Baker, 1930). Incubation is mostly done by females and lasts 26-27 days with male nearby. The young fly within a few days of hatching (Baker, 1930).

The present study was conducted in kalam conservancy with the aims and objective to study the spatial distribution and nidification record of Himalayan Monal and Koklass pheasants and to find out the vegetation habitat of the Himalayan Monal and Koklass pheasant in the study area.

Materials and methods

Study area

The study was conducted in Kalam Conservancy. Kalam conservancy lies in the extreme north of Swat district at a distance of about 100 km from Mingora city between 35° – 26'and 35°- 40' North latitudes and 72°-12' and 72°-45' East longitudes with an area of about 2093.8 Km². It is bounded on the North by Gilgit and Chitral District, on the East by Indus Kohistan, on the South by Bahrain Kohistan and on the West by Dir District.

The conservancy consists of these valleys, namely Bahan, Janshai, Anakar, Batandar, Godar, Shahoo, Mahodand, Utror and Gabral. Total population of the conservancy is 62,521 with total households 6,234 **(**Mountain Area Conservation Project, documents**)**. Population density in Kalam is 25 persons per km².

Fieldwork and Methodology

To conduct research work on the prescribed objectives i.e. Spatial distribution and Nidification. The study was carried out in three sites (Janshai, Anakar and Batandar) from April 2012 to April 2013. The spatial distribution of Himalayan Monal and

Koklass was find out by survey the whole sites in each month of the year but there is no record in months of November, December, January, February, and March because in these months the area is hard to access. During survey three nests, one of Himalayan Monal pheasant and two of Koklass pheasant, were observed and morphometric data was recorded along with microhabitat analysis.

Results

Spatial distribution

Spatial summer and winter distribution of the Himalayan Monal (*Lophophorus impejanus)* and Koklass (*Pucrasia macrolopha)* was assessed during study period in the study area. The Himalayan Monal was recorded from lower elevation in batandar site up to higher elevation point in Janshai ranging between 2411m to 3773m (Table 1). The Koklass is limited in their altitudinal migration and observed in the study area in abundance from lower boundary of the forest zone to the upper forest line near to sub alpine scrubs zone.

Table 1. Koklass and Himalayan Monal observed in different elevation in different months during the study period 2012-2013.

Date	Pheasant	Altitude(feet)	Location	site
28 April 2012	Koklass	7635	35°30.341N 72°31.206E	batandar
29 April 2012	Koklass	7902	35°32.462N 72°33.526E	janshai
12 may 2012	Koklass	8620	35^{0}31.379N 72^{0}31.144E	batandar
13 may 2012	Koklass	8981	35^{0}31.709N 72^{0}31.425E	Anakar
19 June 2012	Koklass	9305	35^{0}33.160N 72^{0}35.265E	Janshai
23 aug 2012	Koklass	10108	35°31.427N 72°35.233E	Janshai
27 April 2012	Himalayan Monal	7913	35°31.004N 72°31.247E	Batandar
10 may 2012	Himalayan Monal	9051	35°33.055N 72°35.202E	Janshai
12 may 2012	Himalayan Monal	9927	35^{0}31.830N 72^{0}31.778E	Anakar
13 may 2012	Himalayan Monal	10225	35^{0}31.363N 72^{0}30.513E	Batandar
13 may 2012	Himalayan Monal	10618	35^{0}31.299N 72^{0}30.171E	Batandar
23 July 2012	Himalayan Monal	12381	35°34.314N 72°34.459E	Janshai

The Himalayan Monal was observed in various altitudinal locations month wise. On first study period in the month of April it was observed in Batandar site on elevation of 2411m from sea level while it was also observed in the middle of forested areas. In the May Monal were noted in a covey form estimated 5 individuals flushing suddenly from the foraging site which was glade in the forest of Janshai at elevation 2758m. During this month of May many Himalayan Monal pheasants were observed two physically seen in Chetynaar,

a small grazing point in batandar, at elevation 3116m and the other in Dira Banda, also small grazing point for livestock in Batandar, at 3236m elevation and more than ten sounds heard at different places in one day in Batandar and similarly in Anakar (table 1) two Himalayan Monal were noted in this month on elevation of 3025m on 13 may, 10: 16 AM. While resting on the same place many calls of male Monal

pheasants were also heard from the dense forest. In the month of June only a nest was noted in Janshai (Table 1) on 19 June 2012 at elevation of 2879m on 12:34 PM, which indicates their nesting elevation. When the study area was searched in the month of July in the whole study sites only single male Himalayan Monal was observed in Janshai at elevation of 3773m on 23rd of July.

Table 2. Nidification of the Himalayan Monal and Koklass pheasants in Kalam District Swat, KP, Pakistan.

Species	Koklass	Koklass	Himalayan Monal
locality of the nest	Batandar	Janshai	Janshai
form of nest	active	active	Active
Date	12-May-12	19-Jun-12	19-Jun-12
Time	9:45 AM	10:09 AM	12:34 AM
altitude (Feet)	8620	9305	9447
Latitude	35^0 31.379 N	35^0 33.160 N	35^0 33.719 N
Longitude	72^0 31.144 E	72^0 35.265 E	72^0 35.583 E
Temperature	16^0C	17^0 C	18^0 C
Humidity	58%	58%	54.80%
heat index	16.5^0C	17.5^0 C	19.1^0 C
dew point	9.8^0 C	9.9^0 C	13.3^0 C
Circumference	79 cm	73cm	81 cm
depth of the nest	13cm	11cm	16 cm
thickness of the wall	1.5cm	1.1 cm	
outer diameter	25cm	24 cm	
inner diameter	22 cm	21.8 cm	30 cm
nest composition	dry needle leaves of Pinus and oak, fallen feathers of Koklass, twigs of oak	Pinus dry needles leaves, Koklass fallen feathers and dry twigs	dry leaves of oak, Pinus and fir, twigs of spruce and oak
position of nest	below the oak tree on steep place	inside the soil below the dead log of silver fir on slope place	in exposed roots of fir as a simple depression on the slight plane place
direction of nest	south west direction	southward direction	toward north direction
habitat of nest	mixed coniferous forest	mixed coniferous forest	on the upper line of forest with high population of fir trees, thinly pinus and oak
No of eggs	10	no eggs	no eggs
adults found in nests	female on eggs	fresh feathers	nothing observed in the nest

Koklass pheasant were found mostly in the dense forested areas of all study sites. During study period more than 100 calls of Koklass were heard from the thickly tree populated zones. This pheasant was seen in the first survey in the month of April at elevation of 2327m in Batandar and on the next day in Janshai one Koklass while flushed from the oak tree was also observed at elevation of 2408m from sea level. In the next month a female Koklass was suddenly observed in the nest on eggs on 12 may 2012 at elevation of 2627m in Batandar and one Koklass was seen on flight from the foraging site on 13 may 2012 at elevation 2737m in Anakar (Table 1). When the area was visited in June a Koklass was observed in janshai on 19 June 2012 at elevation of 2836m. During month of August it was confirmed by two calls of male Koklass in Janshai at elevation of 3080m (table1).

Nidification

Nidifcation is the process which means that how birds build their nests. Similarly Koklass (*Pucrasiamacrolopha)* and Himalayan Monal (*Lophophorusimpejanus)* also build nests in the wild for laying eggs. During the whole survey plan two nests of Koklass and one nest of Himalayan Monal pheasant was observed. The Koklass nests were observed in Batandar (Fig 1) and Janshai areas while the only one nest of Himalayan Monal was observed

in Janshai (Fig 2). One nest was observed at Batandar. The remaining two nests were observed with the help of local person who regularly visit these areas for the collection of *Morchellaesculenta,* an edible fungus also important source of economy for the local inhabitants of kalam, it was also reported that nine eggs were present in the Koklass nest and 5 eggs in the of Himalayan Monal nest. So they were active nests. Table 2.

Fig. 1. Nest of Koklass pheasant with ten eggs observed in Batandar during study period 2012-2013.

First nest of Koklass was seen in Batandar on 12 may 2012, at 8620 feet elevation from the sea level. The temperature recorded on the nest place was 16 C° on 9:45 AM, while the humidity was 58 %. This nest was present in the place where there was no human rout or other animals passing through the nests. It was safe from all kind of disturbances. This nest was present on steep very slightly slope place. On the north eastern side of the nest was hill and their south western side was open so directed towards south west. Nest was made inside just below the *Quercus semecarpifolia* tree and was architecturally made as other birds make. The nest was totally inside the ground. The nest was composed of the dry needle like leaves of *Pinus wallichiana* tree, dry and decay leaves of *Quercus semecarpifolia,* the fallen feathers of the Koklass was also present, and the twigs of different shrubs and *Quercus semecarpifolia* tree were also seen. The circumference of the nest mouth was 79 centimeter, depth of the nest was 13 cm, thickness of the wall was 1.5 cm, outer diameter of the nest was 25 cm and inner diameter of the nest was 22 cm. 2 cm high from the ground level but mostly surrounded by other dead and decaying leaves and twigs materials (table 2).

Fig. 2. Nest of Himalayan Monal in janshai during study period 2012-2013.

The surrounding of the nest was inhabited by *Cedrusdeodara, Quercussemecarpifolia, Pinuswallichiana,* among trees, while shrubs plants species present in the area was mostly *Viburnum grandiflorum*and *Rhamnuspurea*species. The herbs covered the ground layer and found in the vicinity of the nest were mostly *Frageriavesca, Acteaspicata,Solidagovergaaurea, Dipsacusinermis, Geranium wallichianum, Primuladenticulata, Primularosea, Paeoniaemodi, Podophylumemodi, Thalictrumcultratum, Anemone falconeri, Corydalis diphyla, Corydalis stewartii, Corydalis govanianum, Sambucuswightiana, Hypericumperforatum, Pseudomarfeusiaperviflora, Impatiens brachycentra, Thymus linearis, Anaphalistriplinervis* and *Cortusabrutheris.*

The second nest of Koklass was observed on 19 June 2012 in Janshai zone. This nest was at elevation of 9305 feet above sea level. The temperature of the habitat of the nest on the spot was 17 C° on 10:09 AM, while humidity was 58%. This nest was present on awell slope place area just inside below the large log of silver fir towards the roots side. This nest was also made technically like other birds but the materials were not much abundant as compared to the nest of Batandar site. The nest was directed towards southern aspect. This nest was totally inside the ground. The nest was made mostly from dried twigs

and leaves of *Abies pindrow, Pinuswallichiana,* and with fallen feathers of Koklass. The circumference of the nest at mouth region was 73 cm, 1.1 cm wall thickness, while outer diameter was 24 cm and the inner diameter was 21.8 cm. The surrounding habitat was mostly covered by different trees including *Cedrus deodara, Abies pindrow, Piceasmithiana* and *Pinuswallichiana*. The ground was totally covered by *Sambucuswightiana* with associated small amount of other herbs like *Frageriavesca, Acteaspicata, Solidagovergaaurea, Dipsacusinermis, Geranium wallichianum, Primuladenticulata, Primularosea, Paeoniaemodi, Podophylumemodi, Thalictrumcultratum, Anemone falconeri, Corydalis diphyla Hypericumperforatum, Pseudomarfeusiaperviflora, Impatiens brachycentra, Thymus linearis, Anaphalistriplinervis, Cortusabrutheris, Rumexdentatus, Taxicumofficinalis*etc.

The Himalayan Monalnest was recorded at Janshai on the 19th June of 2012, at 9447 feet elevation above the sea level. The temperature of the place on 12:34 PM was 17 C° and the humidity was 54.8%. This nest of Himalayan Monal was present just in the middle of two exposed roots of *Abies pindrow* in a depression in the base below the tree. This nest was not technically built as that of Koklass which was designed architecturally like a permanent nest. The Himalayan Monal nest was a temporary scrape on the ground. This nest was totally inside the ground. It was also reported from the local guide that all the nest of Himalayan Monal which he noted in his life are always a temporary depression in the ground. In this nest the bottom was covered with the dry leaves and twigs of *Abies pindrow* and *Quercussemecarpifolia*and some dry leaves of oak were also seen in the nest and on the side of the nest. The nest was directed towards north side as the hill was on the backside toward south. The place where nest was observed was slightly slope and mostly plane. The ground was mostly covered by the dry leaves of oak, Pinus and *Abiespindrow* trees. The floral composition around the nest was consists of *Abiespindrow Pinuswallichiana* and *Quercussemecarpifolia* trees. The shrubs were mostly *Rosawebbiana* and *Berberiscallibotrys*. The herbs observed were *Frageriavesca, Acteaspicata, Solidagovergaaurea, Primuladenticulata, Primularosea, Podophylumemodi, Thalictrumcultratum, Corydalis stewartii, Corydalis govanianum, Impatiens brachycentra, Thymus linearis, Anaphalistriplinervis, Cortusabrutheris,* etc.

Discussion

The survey for Himalayan Monal and Koklass was conducted from the march of 2012 to march 2013. However during March 95 percent of the study area was covered by snow. Thus no data could collect. So the regular survey was started from April and each site is visited once in a month from April to September of 2012.

Spatial distribution

First of all their spatial distribution was taken in observation to assess the seasonal migration patterns from higher elevations to lower elevated areas. The Himalayan Monal in the month of April during the present study was observed in Batandar at 2411m (7913ft) elevation. But it was also reported by the local guide that during the month of December, January and February they were coming down and have seen several time in the base town of the hill due to heavy snow fall which is estimated 7018 feet high from sea level. According to Ramesh (2003) the Himalayan Monal was also recorded on 2000m (6560ft) elevation. In this month the Monal pheasant's calls were heard on different times from slight higher elevations which indicate their presence in the same elevation. Human interruption also affects their activities so they start moving up. Pheasants are mostly exploited in all habitats by human to use pheasants and their eggs as their tools of economy (Simiyu, 1998; IUCN, 1998). During April the local residents start visiting the forest to collect morel fungus locally known as "Gujji" the (*Morchellaesculenta)* due to which the Himalayan Monal moves to higher altitude because why in the

May it was recoded on 2758m (9051ft), 3116m (10225ft) and 10618 feet elevations in Janshai and Batandar respectively. It was also recorded on 9927 feet elevations which clarify the disturbance due to human exploitation in their natural habitats. As the shepherds along with their herds start migration to the pastures then these pheasants move to upper meadows on higher elevation. In the month of June not a single Monal was observed in their habitats in all sites only a nest was observed in Janshai at 2879m (9447ft) elevation which indicated their nesting location in that elevation. When these pastures are used by the herds then these herds are carried to further higher elevations. According to Zaman (2008) pheasants are very shy birds generally. So when they saw anyone in their habitats they never remain there for a bit of time suddenly change their place and moves away. After a long time of searching all the three sites only single Monal was observed in alpine grassland at 3773m (12381 ft) elevation in Janshai. From the local report it was confirmed that these Monal pheasants migrates to higher elevation sometime above alpine meadows in the rocky areas. Jamroz khan a thirty years expert in the field of wildlife current deputy ranger wild life Kalam reported that the Himalayan Monal pheasant start downward migration following the herds. The Himalayan Monal ranges in elevation in between 7500 feet to 13000 feet. According to Mirza (1980) Monal is found in elevations between 2700 m to 4000 m in rocky and birch trees zone. While Ali and Ripley (1983) reported their range between 2500m to 5000m in the different months of the year. When their natural habitas are starting to be free from the herds then these pheasants come to lower elevations in the month of October and November, reported by the residents of the study areas. Jamroz khan and Faqir Gul, former deputy ranger Kalam Swat, reported that during the heavy snowfall of 2005 and 2010 Himalayan Monal was also recorded in the main Kalam area, about 2042m (6700ft) high from sea level. Ramesh *et al.* (1999) observed that Himalayan Monal mostly used higher altitudinal habitats, followed by moderate or middle elevated habitats and the habitats of lower altitudes are less used by Himalayan Monal as well as stated that lower habitats are mostly used in the winter seasons.

The Koklass pheasants mostly inhabit the forested areas because they were observed mostly in the forest and there is no record for the confirmation of this species above forest line. They are mostly seen in thickly dense forest from 2327m (7635 ft) from Batandar to 3080m (10108ft) elevation in the steep place of Janshai. The Koklass is the only species which can easily be observed by their calls in the month of April and May and the first Koklass pheasant was observed at Batandar in April at 2327m (7635ft) elevation. But it was confirmed with the help of local residents that Koklass are much more in the near vicinity of the base villages of the study area during December, January, and February. According to Gaston *et al.* (1981) this species descends to 2200m (7217ft) elevation. Ramesh *et al.* (1999) also reported that Koklass pheasants are found at elevation of 1900m to 2700m in winter season. Their nesting elevation in the study area is between 2590m (8500ft) to 2895m (9500ft), as two nests were observed one in the month of May on 2627m (8620ft) in Batandar and the other in the month of June in Janshai sites at elevation 2836m (9305ft). But with the start of herds grazing these pheasants start migrating from slope and plane areas to steep hard mountainous places where there is no accessibility of human being or very less approach to that places. The Koklass observed in the month of August in at higher elevation of 10108 feet (3080m). Zaman (2008) reported that Koklass are found at elevation range between 2000m to 3700m in Khyber Pukhtunkhwa. Residents reports confirmed that these pheasants remain up to October in these steep places with the start of snowfall these also begin downward migration. The whole discussion summarize that downward migration is due to snow which covers their habitats in the months of November, December, January and February while the upward migration in June, July, august and September is due to human interruptions and grazing of livestock which cover

their natural habitats. Ramesh *et al.* (1999) stated that altitudinal migration of pheasants is due to heavy snowfall on higher elevation zones.

Nidification

During the whole study period two nests of Koklass pheasants and one nest of Himalayan Monal pheasants were observed. This is the first nidification record of the nests of Koklass and Himalayan Monal pheasants from Kalam swat. The observation of the Koklass nest in the Batandar area was such that the nest was present beneath the Oak tree in bushy habitat at elevation of 8620 feet from sea level. The nest was placed on ground in depression lined with dry leaves of oak and Pine trees, Koklass fallen feathers were also observed and twigs of Oak and different shrubs were used in making nest. Ramesh *et al.* (1999) also described that Koklass nesting mostly on the ground. The present nest is present on precipitous steep and light sloppy place. The nest was in southwest direction. The diameter, wall thickness, inner and outer diameter, circumference at open end and depth of the nest was totally measured. The nest surrounding was densely populated by Oak, Cedrus, and pine trees. The *viburnum* and *Rhamnus* were maximum in the surrounding in shrub vegetation. The present nest matched the nest observed by Baker (1930), stated that Koklass mostly making nests in thick bushy sites. The second nest of Koklass pheasants on the Janshai was present under a dead log of Silver fir and was made of the same composition observed in batandar site but the materials used in the nest were less as compared to the first nest. But this nest present on higher elevation (9305 feet) from sea level. Both nests of Koklass observed matching the nest observed in Pallas valley (PCDP, 2002) in which the nests of Koklass were found mostly on the ground in bushy sheltered area or roots of trees. This altitudinal difference shows that Koklass nesting between 8500 feet to 9500 feet as recorded in the study area. This habitat was sloppy and directed towards south. The direction of the nest concluded from the study is mostly southward. The present nest composition of Koklass pheasant matches the nests describe by Zaman (2008) that nest is generally composed of small sticks, feathers, twigs, and grasses. The composition and the measurement of the two nests are same. The similar report regarding nests site was also provided by local residents that Koklass mostly making nests in bushy places, under a log or rock and sometime inside small holes.

The Himalayan Monal nest was measured and recorded first time in Kalam valley, Swat. The present nest was found on 9447 feet elevation in the base of Fir tree in roots. The nest was a simple depression scratched by female with feet and the bottom was lined with dead leaves of Oak, Pine and fir trees. The habitat of the nest was sloppy and plane. The ground was mostly covered with dry and decayed leaves of Oak, Pine and Fir. The area was covered by mixed population of Oak, Pine and Fir trees. Reports from the local residents shows that most of the nests of Himalayan Monal seen in these areas are mostly hollow temporary scratch on the ground under a rock or logs of trees but on steep and hard precipitous places. This nest matches the nests observed by Hume and Oates (1890) in India, who stated that Monal lays egg in bare depression, generally scratched by female Monal sheltered under a hanging rock or under the massive roots of large trees or sometime inside thick tufts of ferns, while the depression is less lined with grasses, dead leaves or little mosses. The present nest was not well built like Koklass pheasant because this was a simple scratch in the ground and the Koklass nest was a perfect nest like other birds and just dead and dry leaves were scratched by female and make a simple hollow depression on the ground. This nest was active nest because it was confirmed with the help of local residents who daily visits the concerned sites for collecting edible mushroom (*Morchellaesculenta)* that there were five eggs in this nest. Unfortunately the nesting season and mushroom collecting season is in the same months which also consider major threats to the pheasants because these people sometime destroy their nests and also obtain their eggs. The recitation of Hume

(1890) that long ago my friend Mr. Frederic Wilson, famous Mountaineer wrote me that female Monal makes her nest under a small hanging bush or bunch of grass, and lays five eggs of a dull white, spotted with reddish brown. The chicks are hatched about the end of May and further wrote that the Monal breeds at elevations from 8000 to 12,000 feet in all kinds of forest. Some begin to lay early in May, others not till the end of the month. The nest is placed in much the same situations as that of the Koklass - that is to say, always under some slight shelter, an overhanging bush or tuft of grass, or rock or stone, or in the hollow at the foot of a tree, or under an old trunk. It is merely a hole scraped in the ground; but bits of grass, leaves etc. which are around it, are often dropped in, and, with some feathers from the bird, form a sort of lining. The PCDP (2002) also stated that Monal nests are always hollow concealed scratch under a rock or tree logs.

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