

Emei Shan Liocichla: population, behavior and conservation

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Abstract Endemic to China, the Emei Shan Liocichla (*Liocichla omeiensis*) is considered globally vulnerable by the IUCN because of its small, declining population and fragmented range. The species has been recorded in only a few mountainous forests in south-central Sichuan and in the extreme northeast of Yunnan Province. We summarized the basic eco-biology information on its habitat, breeding, winter habits and behavior, voice, population status, research and conservation.

Keywords Emei Shan Liocichla, habitat, breeding, population, conservation

Introduction

The Emei Shan Liocichla (*Liocichla omeiensis*) is endemic to China with a highly localized range (Cheng et al., 1987). The species has been recorded in only a few mountainous forests in south-central Sichuan and in the extreme northeast of Yunnan Province (MacKinnon et al., 2000; Lei and Lu, 2006) on the eastern edge of the mountains of southwestern China's global biodiversity hotspot (Conservation International, 2011). This species is considered globally vulnerable by the IUCN because of its small, declining population and fragmented range (BirdLife International, 2013) and is listed in Appendix II of CITES. It is also ranked as a provincially protected species in Sichuan (Li, 1995).

Emei Shan Liocichla is a smallish, grey-and-olive babbler of about 17 cm in length with sexual dimorphism in its plumage (MacKinnon et al., 2000). The males have extensive orange-red on their undertail coverts and tip of their tail, while these areas are yellow on females (BirdLife International, 2013). The males

also have more prominent red wing-patches than the females (Fig. 1).

Habitat

Typical habitats of the Emei Shan Liocichla are the edges of or gaps within evergreen broadleaf forest and evergreen and deciduous broadleaf mixed forest at elevations between 500–2400 m. Emei Shan Liocichla often moves around in thick bamboo or lower layers of scrubs, occasionally moving up into trees. Investigations have shown that the species undertakes a seasonal vertical migration (Fu and Zhang, 2011), spending the breeding season at elevations of 1400 to 2400 m but migrating to lower levels between 500 and 1350 m in winter. Accordingly, the Emei Shan Liocichla uses various habitats in different seasons. Its breeding habitat mainly consists of scrubs and bamboo, while its winter habitat is dominated by scrubs and herbs (Fig. 2).

Breeding

The Emei Shan Liocichla arrives in its breeding areas in late March or early April. The breeding season is from April to August. A study of 34 nests showed that 80% were in bamboo (*Chimonobambusa szechuanensis*). Vegetation around nests consists mainly of bamboo, small

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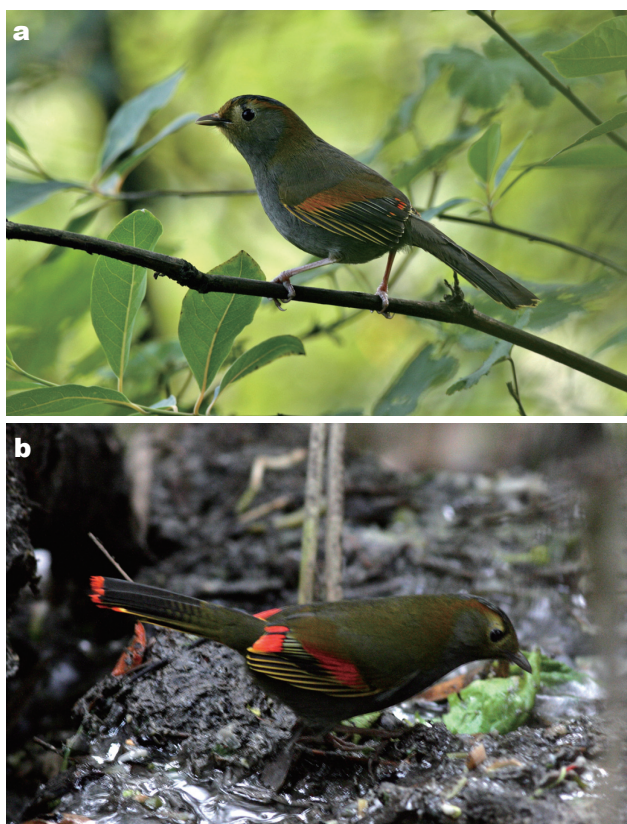


Fig. 1 Emei Shan Liocichla adults. (a) female (Photo by Dai Bo at Laojunshan Nature Reserve in May 2007); (b) male (Photo by Ye Hang at Emei Mountain in January 2013).

shrubs and lianes with few large trees. Nests are cup-shaped with a mean height of 137.5 ± 4.6 cm above the ground. Eggs are oval-shaped with a glaucous or bright blue color, irregularly marked with dark red-brown lines and spots (Fig. 3). The mean clutch size, determined from a total of 10 nests, was 2.9 ± 0.2 eggs (range 2 to 4, mainly 3, occasionally 4). Both males and females were observed participating in incubation, provisioning and brooding the nestlings (Fig. 4). The diet of nestlings consisted of various invertebrates (mainly Lepidoptera). The incubation period was about 14 days and the nestling period about 13–14 days. Hatching success was 58.6%, fledging success 70.8% and nest success 27.5% (based on a total of 14 nests). Nest predation and human disturbances were the two main factors affecting breeding success of the Emei Shan Liocichlas. Its potential nest predators include small mammals (e.g., *Callosciurus erythraeus* and *Mustela sibirica*), birds (e.g., *Urocissa erythrorhyncha* and *Garrulus glandarius*) and snakes (e.g., *Trimeresurus stejnegeri* and *Elaphe taeniura*) (Fu et al., 2011).

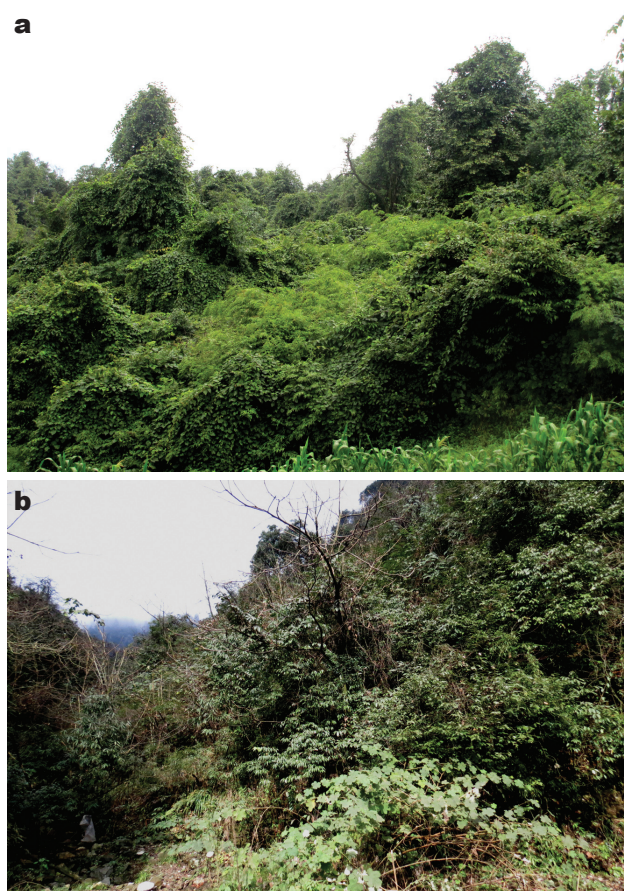


Fig. 2 Typical habitat of Emei Shan Liocichla. (a) breeding habitat; (b) winter habitat.

Winter habits and behavior

To adapt to the cold weather in the mountains of southwestern China in winter, the Emei Shan Liocichla moves to lower areas (500–1350 m) in late autumn and prefers to select sunny slopes. It is often found singly or in pairs, occasionally in flocks of 3–4 individuals, suggesting that the Liocichla is not a typical grouping babbler, in contrast with other Liocichla species (Luo, 1987; Athreya, 2006; del Hoyo, 2007). It seems not to join flocks of other bird species. Its winter diet is mainly composed of both fruits of scrub species and seeds of herbs. Sometimes, this species forages around the kitchens of residential areas where they will feed on discarded noodles, vegetable leaves and rice (Fig. 1b). Behavioral observations suggest that the species is territorial in winter as well as during the breeding season. This winter territorial behavior, unusual amongst babblers, is currently the subject of a study being conducted at the Emei Mountain in Sichuan.



Fig. 3 Nest and egg of Emei Shan Liocichla

Voice

The male has a characteristic song (a loud and complex whistle) for most of the year, which can be reliably identified within 200–300 m. It is difficult to see the Liocichla in the field due to its secretive nature and the dense vegetation of its habitat. It can be detected easily, however, using playback of male songs. To a certain extent, the typical song of the male in the breeding season is different from those used in the non-breeding season (Fig. 5). The female utters a loud, monotonous whistle with one or two syllables, usually heard from those separated from their mate or from unpaired individuals. Both males and females can utter a continuous and anxious warning call when encountering potential danger.

Population status

Delacour (1933) described this species as “very local, but not rare” at Emei Mountain. On the basis of records at two valleys in the Liangshan ranges during his 1998 surveys, Dai (1998) estimated a mean population density of 59.6 individuals per km², with higher densities in secondary forests (90.0 per km²) than in primary forests (50.2 per km²). One of our recent investigations of the breeding population density of Emei Shan Liocichla was conducted from May to June in 2010, using line transects in five study areas: Wawushan Nature Reserve, Emei Mountain, Laojunshan Nature Reserve, Forest Farm No. 211 in Leibo County and Forest Farm No. 212 in Leibo County. A total of 77 transects were established, each between 1 and 3 km in length. The total length of transects was 182 km, covering a large number of vegetation types and most of the elevational



Fig. 4 Nestlings of Emei Shan Liocichla. (a) one-day nestlings; (b) six-days nestlings.

ranges within the study areas. The results indicated that total breeding density ($1.75 \pm 0.36 \text{ } \text{♂}/\text{km}^2$) of this species was very low (Fu, 2011). Since it is known from only a small number of localities, and appears to be highly localized in the mountain ranges where it does occur, its total population may be rather small (BirdLife International, 2001). The population is suspected to be declining at a moderate rate, in line with rates of habitat loss and degradation within its range (BirdLife International, 2013), though more research is needed to determine the exact nature of this decline. Established protected areas within its suitable habitat consist largely of the Mamize, Laojunshan, Mabian Dafengding and Heizhugou nature reserves, the Emei Shan Protected Scenic Site, as well as the Wawushan and Labahe nature reserves.

Research and conservation

Published research on the Emei Shan Liocichla mainly

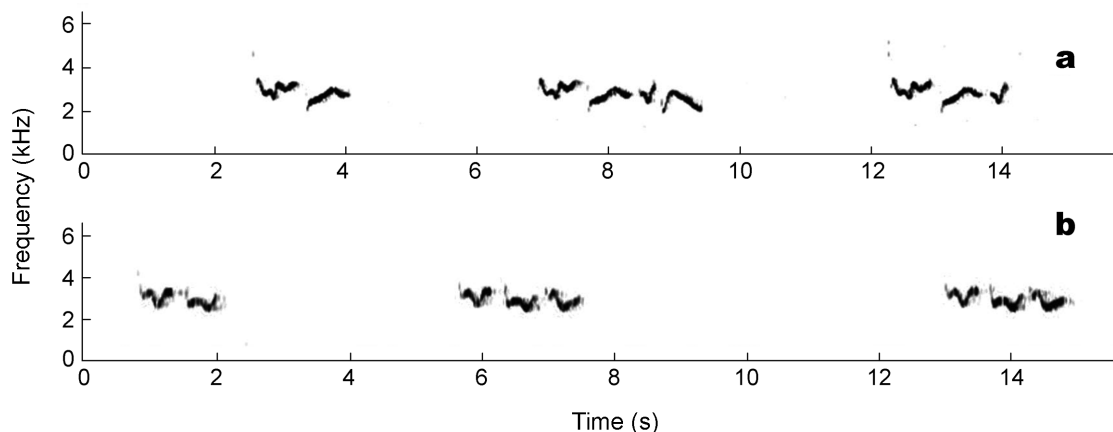


Fig. 5 Spectrograms of typical songs of a male Emei Shan Liocichla. (a) breeding season; (b) non-breeding season.

relate to its breeding ecology (Jiang et al., 2007; Han et al., 2011; Fu and Zhang, 2011; Fu et al., 2011, 2012). The main threat posed to this species is the loss and fragmentation of forests within its range, much of which has already been cleared or degraded through logging, firewood collection and conversion to agriculture (BirdLife International, 2013). However, little attention has been given to the conservation of this species and its habitat. Further work is needed to identify the precise habitat requirements of the Emei Shan Liocichla, using a GIS-based approach, both during the breeding season and at other times of the year. A greater understanding of how this species uses its habitat would enhance efforts to conserve it through protection and management of optimal habitat (Fu et al., 2011).

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References

- Athreya R. 2006. A new species of *Liocichla* (Aves: Timaliidae) from Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India. *Indian Birds*, 2:82–94.
- BirdLife International. 2001. *Threatened Birds of Asia: the BirdLife International Red Data Book*. BirdLife International, Cambridge.
- BirdLife International. 2013. Species factsheet: *Liocichla omeiensis*. <http://www.birdlife.org/datazone/speciesfactsheet.php?id=7829>. Accessed 10 April 2013.
- Cheng TH, Long ZY, Zheng BL. 1987. *Fauna Sinica. Aves Vol 11. Passeriformes, Muscicapidae II. Timaliinae*. Science Press, Beijing. (in Chinese)
- Conservation International. 2011. *The biodiversity hotspots*. Conservation International, Arlington, Virginia, USA. <http://www.biodiversityhotspots.org/Pages/default.aspx>. Accessed 10 January 2011.
- Dai B. 1998. *Sichuan hill-partridge forest conservation report: report on the 1998 field season*. Unpublished report to World Pheasant Association and Sichuan Provincial Forest Department. (in Chinese)
- del Hoyo J, Elliott A, Christie DA. 2007. *Handbook of the Birds of the World. Vol. 12. Picathartes to Tits and Chickadees*. Lynx Edicions, Barcelona.
- Delacour J. 1933. Exhibition of, and remarks on *Liocichla omeiensis* and *Alcippe variegaticeps* from China. *Bull Brit Orn Club*, 53(4):85–88.
- Fu YQ, Dowell SD, Zhang ZW. 2011. Breeding ecology of the Emei Shan Liocichla (*Liocichla omeiensis*). *Wilson J Ornithol*, 123:748–754.
- Fu YQ, Dowell SD, Zhang ZW. 2012. The application of temperature data loggers for remotely monitoring the nests of Emei Shan Liocichla (*Liocichla omeiensis*). *Zool Sci*, 29(6):373–376.
- Fu YQ, Zhang ZW. 2011. The influence of abnormal low-temperature of spring and summer on the breeding of Emei Shan Liocichla (*Liocichla omeiensis*). *J Beijing Normal Univ (Nat Sci)*, 47(3):292–295. (in Chinese)
- Fu YQ. 2011. *Studies on the breeding ecology of Emei Shan Liocichla (Liocichla omeiensis)*. Ph.D. Dissertation, Beijing Normal University, Beijing. (in Chinese)
- Han LX, Deng YX, Chen BP, Ling ZW, Chen WC. 2011. Primary

- observation on breeding behavior of *Liocichla omeiensis* in Laojunshan Nature Reserve, Sichuan Province. Sichuan J Zool, 30(3):442–445. (in Chinese)
- Jiang YX, Sun YH, Ji T, Lin JL, He QQ, Feng SL, Lin ZW. 2007. A nest note of the Emei Shan Liocichla (*Liocichla omeiensis*) at Laojunshan Natural Reserve, Sichuan, China. Chin J Zool, 42:130. (in Chinese)
- Lei FM, Lu TC. 2006. China Endemic Birds. Science Press, Beijing. (in Chinese)
- Li GY. 1995. The Colour Handbook of the Birds of Sichuan. China Forestry Publishing House, Beijing. (in Chinese)
- Luo LC. 1987. The biological study of *Liocichla steerii* at Chitou area. Thesis. National Taiwan University, Taipei, Taiwan. (in Chinese)
- MacKinnon J, Phillipps K, He FQ. 2000. A Field Guide to the Birds of China. Hunan Educational Publishing House, Changsha. (in Chinese)

灰胸薮鹛种群、行为及保护

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摘要: 灰胸薮鹛 (*Liocichla omeiensis*) 是我国特有鸟类, 因种群数量稀少和分布区狭窄与片段化, 被IUCN列为全球性易危物种。目前该鸟仅见于四川省中南部和云南省东北部的少数山区森林中。我们从栖息地、繁殖、越冬习性与行为、鸣声、种群状况、研究与保护等方面总结了灰胸薮鹛的基础生态生物学信息。

关键词: 灰胸薮鹛, 栖息地, 繁殖, 种群, 保护