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KARL VERNES^{1*}, TIGER SANGAY^{1,2}, RAJANATHAN RAJARATNAM³ AND RINCHEN SINGYE²

Social interaction and co-occurrence of colour morphs of the Asiatic golden cat, Bhutan

During a short camera trapping survey along an altitudinal gradient in central Bhutan, we detected two colour morphs of the Asiatic golden cat *Catopuma temminckii* socially interacting in the same photo frames. A series of camera trap photos showed an individual of the typical golden morph and another of the considerably rarer spotted or 'ocelot' morph appear at a camera, before a brief bout of 'play fighting'. This is the first time that we are aware of these two colour morphs detected together as a social grouping. During the same survey, we also recorded the grey and black morphs of the Asiatic golden cat, further revealing for the first time that these four colour morphs co-occur at the same locality. Additionally, our data also support previous work that suggested diurnal/crepuscular activity patterns for Asiatic golden cats in Bhutan.

The Asiatic golden cat is a common small cat species found throughout much of South-east and East Asia. The cat derives its common name from the dull golden colour typical of the species, however, it is known to be variable in colour and coat patterning (Sunquist & Sunquist 2002), and in recent times, three other colour morphs have been recorded in Bhutan. Wang (2007) photographed the rare spotted or 'ocelot' morph of the Asiatic golden cat, which was previously only known from China, during an intensive camera trapping program for tigers and leopards in Jigme Singye Wangchuk National Park (Wang &

Macdonald 2009). Later, Jigme (2011) collected 11 camera trap photographs of Asiatic golden cats from a range of altitudes and locations throughout Bhutan, which revealed the presence of two additional new colour morphs for Bhutan: a grey morph and a black or melanistic form. However, Jigme (2011) did not record the spotted morph, suggesting it may be relatively rare in Bhutan.

In this note, we describe a brief social interaction between individuals of the spotted and golden colour morphs of the Asiatic golden cat, and report on the co-occurrence of the four known colour morphs of the species

at the same locality. Additionally, our data from 16 independent records of Asiatic golden cats allowed us to contribute to an understanding of temporal activity patterns of this species in Bhutan.

The study was undertaken in central Bhutan on the campus of the Ugyen Wangchuk Institute for Conservation and Environment (27°32' N / 90°43' E), near the town of Jakar in Bumthang Dzongkhag. Vegetation at the site comprised blue pine *Pinus wallichiana* forest at lower altitude (<3,300 m), mixed conifer forest at mid-altitude (3,300 – 3,600 m), and Bhutan fir *Abies densa* and birch *Betula utilis* at high altitude (3,600 – 3,900 m).

We set 10 pairs of camera traps at altitudes ranging from 2,985 m to 3,900 m, at intervals of approximately 100 m in vertical elevation along a main trail that traversed an altitudinal gradient. Each pair of cameras consisted of one non-baited camera positioned on the main trail to capture large mammals (hereafter called 'on-trail' cameras), and another camera perpendicular to the trail approximately 50 m away and baited with a canister containing peanut butter approximately 1.5 m in front of the camera, aimed to attract smaller mammals (hereafter called 'off-trail' cameras). Deployed cameras were a combination of Reconyx HC500 infrared flash cameras (primarily used on-trail) and Reconyx PC850 white-flash cameras (primarily used off-trail). All cameras were set to take 5 photos per trigger, with no quiet time between triggers, and trigger sensitivity set to 'high'. Cameras were set between 7 and 17 October 2014 and retrieved between 21 and 22 November 2014. Camera trapped individuals of a species were determined to be independent when photographic captures were at least 30 minutes apart.

Asiatic golden cats were recorded on 16 separate occasions during the short survey. Seven of these records were of the golden morph, two of the black morph, two of the grey morph, and two of the spotted morph (Fig. 1), with another two records consisting of two colour morphs in the same series of frames: one golden, and one spotted (SOM T1). The majority of records ($n = 13$ or 81%) came from on-trail cameras, with much fewer records ($n = 3$ or 19%) captured by off-trail cameras (SOM T1).

The golden and spotted morphs were first seen together on 19 October 2014 and again 5 days later on 24 October 2014. On the first occasion (Fig. 2a-e), these cats spent several minutes wrestling or 'play fighting' (Fig.



Fig. 1. Representative images of (a) golden, (b) spotted, (c) grey, and (d) black colour morphs of the Asiatic golden cat recorded during a short camera trap survey at Bumthang.

2b-c), which ended when the golden individual climbed onto, and then stepped off the spotted con-specific that lay on its side (Fig. 2d-e). The golden individual, which appeared to initiate this bout of play, was smaller than the spotted individual, and was most likely its sub-adult offspring. Both observations of this pair were made at the same camera trap at an elevation of 3,717 m in conifer forest dominated by Bhutan fir.

Previous observations of the Asiatic golden cat in Bhutan suggested that this species was mainly diurnal, with some crepuscular activity (Jigme 2011). Our dataset from Bumthang supports this; most records were gathered during daylight hours and an activity curve, fitted using the package 'Overlap' in R (R Core Team 2014) based on the 18 independent records of the Asiatic golden cat, showed that activity was greatest from mid-morning to late afternoon with a peak in activity around dusk (Fig. 3).

Although the golden form of the Asiatic golden cat in Bhutan has been recorded at altitudes between 1,500 m and 4,000 m, Jigme (2011) reported the occurrence of the melanistic form only above 2,500 m, while the grey and spotted morphs were photographed only above 3,600 m, suggesting possible selection for specific morphs at different altitudes, perhaps as a response to changing vegetation cover with altitude (Sangay et al. 2014). Notable too is the spatial separation of the different colour morphs in past camera trapping of the Asiatic golden cat in Bhutan, with any one camera station recording just a single colour morph (see Fig. 2 in Jigme 2011). Similarly, a recent survey in Sikkim, India (Bashir et al. 2011) provided the first photographic evidence of the occurrence of the Asiatic golden cat there, with all 25 photographic records from that study (at 11 sites ranging in altitude from 1,980 m to 3,960 m) comprising the melanistic colour morph. In contrast, our study revealed grey, spotted and golden morphs photographed at the same camera stations (see SOM T1), and on two occasions, spotted and golden individuals socially interacting and probably travelling together as mother and dependent young. Melanistic individuals were also recorded at two cameras at a lower altitude (SOM T1), but spatially very near (within 1,500 m) to the other cameras in the study area, showing for the first time that all four colour morphs of this species co-occur at the one locality. Camera trapping is revealing much about the occurrence of Asiatic golden cats, with



Fig. 2. Sequence of camera trap photos of a golden morph and a spotted morph of the Asiatic golden cat recorded during a camera trap survey at Bumthang, Bhutan.

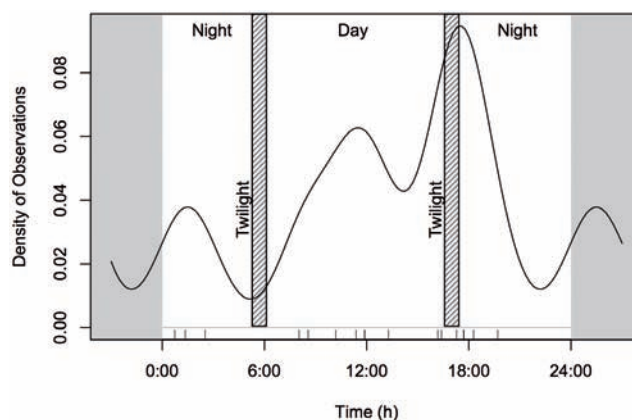


Fig. 3. Kernel density curve of times that Asiatic golden cats were recorded ($N = 18$ independent observations) during a camera trap survey at Bumthang, Bhutan. Hatched bars indicate approximate periods of twilight associated with dusk at dawn, at the time of the study.

recent studies reporting the first photographic evidence of this elusive species in other parts of the Eastern Himalayas (Ghimirey & Pal 2009, Bashir et al. 2011, Lyngdoh et al. 2011). Further camera trapping is required to fill the paucity of biogeographical data on the occurrence of different colour morphs at different altitudes and in different forest types. Because most camera trap studies only record a small number of records, we advocate for an approach whereby wildlife researchers across the range of the Asiatic golden cat collaborate to combine their data. Such an approach would assist greatly in determining whether any patterns exist in the occurrence of different colour morphs with altitude and forest type, further unravelling the ecology and behaviour of the Asiatic golden cat.

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References

- Bashir T., Bhattacharya T., Poundyal K. & Sathyakumar S. 2011. Notable observations on the melanistic Asiatic Golden cat (*Pardofelis temminckii*) of Sikkim, India. *NeBIO* 2, 1-4.
- Ghimirey Y. & Pal P. 2009. First camera trap image of Asiatic golden cat in Nepal. *Cat News* 51, 19.
- Jigme K. 2011. Four colour morphs of and the altitudinal record for the Asiatic golden cat in Bhutan. *Cat News* 55, 12-13.
- Lyngdoh S., Selvan K.M., Gopi G.V., Habib B. & Hazarika M. 2011. Sighting and first photograph of Asiatic golden cat in western Arunachal Pradesh. *Cat News* 54, 17-18.
- R Core Team 2014. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria.
- Sangay T., Rajaratnam R. & Vernes, K. 2014. Wildlife camera trapping in the Himalayan Kingdom of Bhutan with recommendations for the future. *In* Camera Trapping: Wildlife Management and Research. Meek P. Fleming P., Ballard G., Banks P., Claridge A., Sanderson J. and Swann D. (Eds). CSIRO Publishing, Melbourne, Australia, pp. 87-98.
- Sunquist M. E. & Sunquist F. 2002. Wild cats of the world. University of Chicago Press, Chicago, Illinois. 462 pp.
- Wang S. W. 2007. A rare morph of the Asiatic golden cat in Bhutan's Jigme Singye Wangchuk National Park. *Cat News* 47, 27-28.
- Wang S. W. & Macdonald D. W. 2009. The use of camera traps for estimating tiger and leopard populations in the high altitude mountains of Bhutan. *Biological Conservation* 142, 606-613.
- Supporting Online Material SOM Table T1 is available at www.catsg.org
- ¹ Ecosystem Management, University of New England, Armidale, New South Wales 2351, Australia
*kvernes@une.edu.au
- ² Ugyen Wangchuk Institute for Conservation and Environment, Bumthang, Bhutan
- ³ Geography and Planning, University of New England, Armidale, New South Wales 2351, Australia.