

Migration strategies of Oriental Honey-buzzards *Pernis ptilorhyncus* breeding in Japan

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In a recent paper, Higuchi *et al.* (2005) reported data on the autumn and spring migration of three Oriental Honey-buzzards *Pernis ptilorhyncus* tracked by satellite. One adult male, one adult female and one juvenile from the population breeding in central Japan were studied. Here we briefly summarise these results and suggest alternative explanations for some aspects of them.

During autumn migration, the two adults migrated earlier than the juvenile. All three birds reached continental Asia by crossing the East China Sea. However, while the adults flew westwards using a shorter route over water (680 km; Fig. 1), the juvenile took a longer route south-west for about 1,100 km. Upon reaching continental Asia, the adult female moved through China, Vietnam, Laos, Thailand, the Malay Peninsula, Sumatra and finally reached her wintering site in central Java after 52 days (19 September to 9 November 2003, including two stopover days; Fig. 1; tracked distance 9,585 km). The adult male used a very similar route but wintered in Mindanao (Philippines) passing through Borneo, taking 68 days (22 September–28 November 2003) and covering 11,686 km. After the longer sea crossing, the juvenile moved along the coast to Vietnam, and crossed the Gulf of Thailand to reach its wintering area in the Malay Peninsula after 77 days (29 September–14 December 2003, including 41 stopover days at four sites; tracked distance 7,912 km). During the winter, the juvenile moved between the Malay Peninsula and Sumatra. In contrast, the adults were apparently sedentary. The juvenile did not make the spring migration northwards. The female returned on a longer route in spring (tracked distance: 10,651 km), avoided crossing the East China Sea and instead crossed the sea between south Korea and Japan at a point where it is 50–100 km wide (Fig. 1). Her migration lasted 87 days (22 February–18 May 2004) with a long stopover (37 days) in east Myanmar. The spring migration of the adult male lasted 79 days (7 March to 24 May 2004); he was tracked through Borneo, Sumatra and the Malay Peninsula, but the signals were lost at his stopover site in eastern Cambodia between 15 April and 22 May.

DISCUSSION

Why did the birds not use a more direct route via the south-west islands?

Why did these Oriental Honey-buzzards not use a more direct route via the south-west islands of Japan to reach their wintering areas (Fig. 1), as do Grey-faced Buzzards *Butastur indicus*, for example? Higuchi *et al.* (2005) suggested two alternative hypotheses: (a) the diversity and abundance of prey preferred by Oriental Honey-buzzards are limited in the south-west islands; (b) Oriental Honey-buzzards have a lower aspect ratio (i.e. proportionately short wings, *sensu* Kerlinger 1989) than Grey-faced Buzzards and thus they might incur an

unacceptably high energetic cost of migration through the scattered islands from Japan to the Philippines and Indonesia.

Regarding the first hypothesis, food diversity and abundance along the migration route should not be of critical importance in this species, given that soaring raptors, including the European Honey-buzzard *Pernis apivorus*, usually show long-distance fasting migration (Smith *et al.* 1986, Alerstam and Hedenstrom 1998, Hake *et al.* 2003, Panuccio *et al.* 2006). Regarding the second hypothesis, although Oriental Honey-buzzards undoubtedly do have a lower aspect ratio than Grey-faced Buzzards, the three tracked birds undertook some of the longest non-stop powered flights over water recorded among the Accipitriformes (Kerlinger 1989, DeCandido *et al.* 2006a). Higuchi *et al.* (2005) estimated that the adult female took 25–30 hours to cross the sea. Clearly, the species is able to cover hundreds of kilometres over water and, like European Honey-buzzard (Agostini *et al.* 2005), it has navigation systems that function both during day and night. Indeed, the multiple islands located along the southern



Figure 1. Approximate routes used during autumn and spring by the adult female Oriental Honey-buzzard (solid lines), and a possible alternative route between Japan and the Philippines via the south-west islands of Japan (dotted line).

route would have necessitated shorter non-stop flights over sea (with a maximum of 230 km between Kume and Miyako) and the opportunity to rest in case of adverse weather.

We suggest that there may not yet have been sufficient time to evolve the more direct route through the south-west islands (assuming that movements shown by the satellite-tracked individuals are representative of all the population in Japan).

Why did the birds not use a shorter sea-crossing via South Korea in autumn?

If the cost of powered flight over water is high, why do birds not use the shorter crossing between Japan and South Korea in autumn, as they do in spring? In this regard, it is interesting to note that the Short-toed Snake Eagle *Circaetus gallicus*, a broad-winged raptor, uses a short pathway over water between the Italian Peninsula and Africa both during spring and autumn, crossing the Straits of Gibraltar (14 km wide) rather than over the central Mediterranean (Agostini *et al.* 2002a, Premuda 2004).

Oriental Honey-buzzards from Japan winter in areas occupied by migrants from continental Asia in addition to resident populations of five races of the same species (*P. p. ruficollis*, *P. p. torquatus*, *P. p. ptilorhynchus*, *P. p. palawanensis*, *P. p. philippensis*) and populations of congeners (e.g. Barred Honey-buzzard *Pernis celebensis* in the Philippines: Ferguson-Lees and Christie 2001). If migrants from Japan face significant competition on their winter quarters with conspecific migrants as well as conspecific and congeneric residents, they may migrate through continental Asia after crossing the East China Sea, rather than via South Korea, in order to reach their wintering quarters sooner and to increase the probability of finding suitable winter territories. Although the sea-crossing is shorter via South Korea, the overall route is significantly longer.

For juveniles, there is another possible explanation. When Oriental Honey-buzzard first colonised Japan, juveniles may have retained the innate tendency to migrate along a north-east–south-west axis, as with European Honey-buzzards (Agostini and Logozzo 1995, Agostini *et al.* 2002b, 2004, Hake *et al.* 2003). If so, and if they have yet to evolve a tendency to use the more direct route through the south-west islands, this may explain why they still take the longer continental route in autumn.

The converse of this question is why did the female take a different route in spring? Higuchi *et al.* (2005) suggested that head-winds may make the East China Sea route difficult at that time of year. Recent studies from the central Mediterranean show that European Honey-buzzards tend to cross water surfaces with tail rather than head winds (Agostini *et al.* 2005). Unfortunately, Higuchi *et al.* did not report data concerning wind conditions in the East China Sea. However, since the female flew very far inland without attempting the water crossing (Fig. 1), she presumably was not directly affected by wind conditions at the East China Sea.

Instead, the explanation may be that adult Oriental Honey-buzzards may have more time to migrate in spring

than autumn, because they leave their winter territories early, primarily during February–early March (see also DeCandido *et al.* 2006b). As a result, they can migrate more slowly, make long stopovers and avoid hazardous sea-crossings by taking the longer but safer route via South Korea (which is also a possible route by which the species colonised Japan).

ACKNOWLEDGEMENTS

We thank R. DeCandido and an anonymous referee for their useful comments on an earlier draft of the manuscript, and G. Mo for checking the English.

REFERENCES

- Agostini, N. and Logozzo, D. (1995) Autumn migration of Honey Buzzards in southern Italy. *J. Raptor Res.* 29: 275–277.
- Agostini, N., Baghino, L., Coleiro, C., Corbi, F. and Premuda, G. (2002a) Circuitous autumn migration in the Short-toed Eagle (*Circaetus gallicus*). *J. Raptor Res.* 36: 111–114.
- Agostini, N., Coleiro, C., Corbi, F., DiLieto, G., Pinos, F. and Panuccio, M. (2002b) Water-crossing tendency of juvenile Honey Buzzards during migration. *Avocetta* 26: 41–43.
- Agostini, N., Coleiro, C. and Panuccio, M. (2004) Analysis of the autumn migration of juvenile honey buzzards *Pernis apivorus* across the central Mediterranean. *J. Raptor Res.* 38: 283–286.
- Agostini, N., Panuccio, M. and Massa, B. (2005) Flight behaviour of honey buzzards *Pernis apivorus* during migration over the sea. *Buteo* 14: 3–10.
- Alerstam, T. and Hedenstrom, A. (1998) The development of bird migration theory. *J. Avian Biol.* 29: 343–369.
- DeCandido, R., Bierregaard, R. O., Martell, M. S. and Bildstein, K. L. (2006a) Evidence of nocturnal migration by Osprey (*Pandion haliaetus*) in North America and Western Europe. *J. Raptor Res.* 40: 156–158.
- DeCandido, R., Allen, D. and Bildstein, K. L. (2006b) Spring migration of Oriental Honey-buzzards and other raptors at Tanjung Tuan, Malaysia, 2000–2001. *Forktail* 22: 156–160.
- Ferguson-Lees, J. and Christie, D. A. (2001) *Raptors of the world*. London: Christopher Helm.
- Hake, M., Kjellén, N. and Alerstam, T. (2003) Age dependent migration strategy in honey buzzards *Pernis apivorus* tracked by satellite. *Oikos* 103: 385–396.
- Higuchi, H., Shiu, H., Nakamura, H., Uematsu, A., Kuno, K., Saeki, M., Hotta, M., Tokita, K., Moriya, E., Morishita, E. and Tamura, M. (2005) Migration of Honey-buzzards *Pernis apivorus* based on satellite tracking. *Ornithol. Sci.* 4: 109–115
- Kerlinger, P. (1989) *Flight strategies of migrating hawks*. Chicago: Chicago University Press.
- Panuccio, M., Agostini, N., Wilson, S., Lucia, G., Ashton-Booth, J., Chiatante, G., Mellone, U. and Todisco, S. (2006) Does the Honey-buzzard feed during migration? *Brit. Birds* 99: 365–367.
- Premuda, G. (2004) [First observations on the circuitous spring migration of Short-toed Eagle, *Circaetus gallicus*, on the Apuan Alps'.] *Riv. Ital. Orn.* 74:119–124. (In Italian with English summary.)
- Smith, N. G., Goldstein, D. L. and Bartholomew, G. A. (1986) Is long-distance migration possible for soaring hawks using only stored fat? *Auk* 103: 607–611.