

Short communications

Flight strategies of Honey Buzzards during spring migration across the Central Mediterranean

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During pre- and post-reproductive migration, the route across the Central Mediterranean is important for Honey Buzzards (*Pernis apivorus*).

During spring migration a large number of individuals have been observed at Cap Bon, Tunisia, and over the Straits of Messina (Thiollay 1975, Dejonghe 1980, Dimarca and Japichino 1984, Agostini 1992, Agostini et al. 1993, 1994) while few individuals were observed in Malta (Sultana and Gauci 1982).

Unlike the other two pathways used by these raptors when crossing the Mediterranean basin, the Straits of Gibraltar and the Bosphorus (Cramp and Simmons 1980, Porter and Beaman 1985), crossing the central Mediterranean entails flying over the Sicilian Channel and the Straits of Messina. Sicilian Channel is 150 km wide, implying a long, powered flight over the sea, with a considerable expenditure of energy. Since thermals are almost absent over water, migrants cannot use soaring alternating with gliding during the crossing, as they do over land (Kerlinger 1989). This study provides information on the spring migration of Honey Buzzards across the Central Mediterranean, through observations at Cap Bon (Tunisia) and the Straits of Messina (Italy), and concentrating on the flight behaviour of migrating individuals.

The Cap Bon peninsula in north-eastern Tunisia is a 25 km-wide plain dominated in the north by a promontory that reaches a height of 392 m, before dropping steeply to the sea opposite Sicily, which is not visible. According to Thiollay (1975), gliding raptors converge along a 2 km-front of this promontory during spring migration, taking advantage of thermals before their long flight across the sea. Thus this area would be extremely important to

monitor the passage of birds across the Central Mediterranean.

The Straits of Messina separates Calabria and Sicily, in southern Italy. In its narrowest part, this stretch of sea is approximately three km wide. Two mountain systems are present: the Aspromonte in Calabria and the Peloritani Mountains in Sicily.

Observations were made 4-16 May 1990 in the Straits of Messina (119 hr) and 3-15 May 1990 at Cap Bon (105.3 hr).

A single observation post was used at Cap Bon (Fig.1) on the promontory at the extreme northern part of the Tunisian peninsula at its highest point.

Two observation posts along the Calabrian side of the Straits between Reggio Calabria and Scilla were used at the Straits of Messina (Fig.1). Though the migratory front appears to be very broad, migration is concentrated along the 15 km of coast around the narrowest part of the Straits (Dimarca and Japichino 1984, Agostini 1992).

Observers were equipped with 10x50 binoculars, telescope, compass, anemometer, IGM map 1:25000 and, at the Straits of Messina, receiving-transmitting radio to avoid recounting the same individuals.

The Tunisian National Institute of Meteorology supplied weather bulletins for Cap Bon, which were recorded at hourly intervals by the station in Kelibia.

At Cap Bon 2124 Honey Buzzards were observed. This number is an approximation. Once raptors reached the coast near the promontory, they rarely started the crossing towards NE and most of them flew back and forth along the coast or even inland, then disappeared towards the south.

Individuals were also observed leaving the coast in a SE direction. Only in a limited number of cases was it



Fig. 1: The study area.

possible to identify individuals, thanks to particular features of their plumage (broken or missing remiges and/or rectrices) or entire flocks, through particular interspecific associations, transit again over our observation posts after an hour or, in the case of the former, repeatedly over several days and thereby avoid recounting the birds. Individuals were seen returning to the coast after disappearing over the sea.

Finally flocks with numerous individuals were seen leaving the coast in a NE direction much farther south than our observation post, but because of the distance it was impossible to identify the species or count the individuals.

Only 743 birds undertook the crossing in a NE direction. As compared to other species frequently observed - the Black Kite (*Milvus migrans*), the Marsh Harrier (*Circus aeruginosus*), the Egyptian Vulture (*Neophron percnopterus*) - this species was the most likely to undertake flight in a NE direction (percentages of individuals crossing respectively 10.4, 6.9, 5.9 and 32.3). The behaviours observed along the coastline near the Tunisian promontory are similar to those reported by Kerlinger (1984, 1985) in his study of numerous species of raptors across Lake Superior and Delaware Bay at Cap May, New Jersey. He also recorded a significant difference in the percentage of individuals of other species undertaking the crossing: the percentage was much higher for species with higher aspect ratio (longer) wings. His hypothesis was that raptors with relatively long wings are more suited to undertake crossings of large bodies of water as this feature decreases the induced drag, and thus the energy needed for powered flight.

Indeed, the Honey Buzzard has a rather streamlined shape, but this feature is undoubtedly evident also in

the other two species we observed, the Black Kite and the Marsh Harrier, which had lower percentages of individuals undertaking the crossing. This result may be distorted by the period in which the observations were carried out. In fact, the Black Kite and the Marsh Harrier migrate earlier in spring than the Honey Buzzard and from 3 to 15 May 1990 there was a much higher percentage of young of the former, which we were unfortunately unable to identify given the difficulties we encountered. As regards the Marsh Harrier, only two adult males were observed. Perhaps results also reflected the fact that the young are not motivated by reproduction to undertake migration. Moreover, the insignificant influence of lateral winds on the Black Kites and Marsh Harriers crossing at Cap Bon (Agostini and Duchi 1994) suggests that these species are suited to undertake crossings of large bodies of water.

Differently the Honey Buzzard, like the Sharp Shinned Hawk (*Accipiter striatus*) above Lake Superior and Cap May (Kerlinger 1984), tends to cross the Sicilian Channel more frequently with weak lateral winds (from ESE) probably to minimize "drifting" (Agostini et al. in press).

It is also interesting that the 20 individuals that left the coast in a NE direction with strong winds blowing from SSW allowed themselves to be transported by the wind, by beating their wings and keeping the longitudinal axis of their body perpendicular to the direction of flight.

In the Straits of Messina, 4223 Honey Buzzards were observed, 48% on one day - 9 May - and 96% over five days. By comparing daily variations in migratory flow with those of Cap Bon, considering the number of individuals that undertook the crossing in the NE direction hourly during the observation period, we note

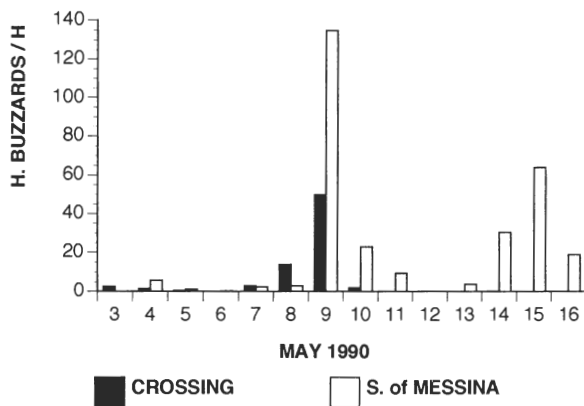


Fig. 2: Variations in migratory flow of Honey Buzzards from 3 to 16 May 1990 at Cap Bon (individuals crossing in a NE direction) and at the Straits of Messina.

a considerable correspondence, with the exception of 14 and 15 May (Fig. 2). This was the only period in which winds on the Tunisian peninsula were from NW.

If we compare the percentages of the various species observed, there is a correspondence between raptors observed in the Straits of Messina and those crossing in a NE direction from Tunisia. The percentages are different if we take into account all birds observed at Cap Bon (Table I).

Our observations at Cap Bon and at the Straits of Messina, do not seem to confirm results reported from Cap Bon by Thiollay (1975, 1977). The migratory front was not concentrated in the two kilometres of coast around the promontory of the Tunisian peninsula and was probably more diffuse. Our study also seems to underline the impossibility of accurately counting migrants because the site is quite unsuitable even for partial surveying of raptors migrating across the Central Mediterranean.

In the sample of 743 buzzards crossing at Cap Bon, flock size was $18.3(\pm 3.1)$. In 46% of cases, once the raptors reached the promontory, they continued migration without moving along the coast or soaring. On four occasions individuals in the flock started soaring before continuing migration. On three occasions certain individuals left the flock and returned inland.

Of the individuals that did not undertake the crossing in a NE direction, flock size was $8.1(\pm 0.7)$ birds; the difference between the mean size of the flock was significant for the two sample groups ($t=4.77$; $p<0.001$).

The Honey Buzzards, in a similar manner to Black Kites (Agostini and Duchi 1994), showed a strong tendency to remain in flock in front to a water barrier since the first individuals taking a decision (crossing or not) are followed by the others.

The importance of flocking behaviour during raptor migration is related to the location of the thermals

(Kerlinger 1989). Studying the autumn Honey Buzzard migration above Malta, Thake (1980) hypothesized that flocking behaviour can also be utilized to diminish orientation errors by way of information transmission.

Such a hypothesis would imply a contemporaneous migration of adults (expert individuals) and young (inexpert individuals). This, however, does not occur among long distance migrating raptors because the adults precede the young during the spring migration (Kerlinger 1989).

The strong tendency of Honey Buzzards to remain in flock at Cap Bon and the low percentage of individuals crossing, suggests that flocking behaviour is important for water crossings, because an increase in flock size increases the probability that the flock will contain one or more individuals with a pronounced tendency to continue migrating.

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Riassunto - Questo studio fornisce dettagliate informazioni sul comportamento in volo del Falco pecchiaiolo (*Pernis apivorus*) sul promontorio di Cap Bon, in Tunisia, e sullo Stretto di Messina, durante la migrazione primaverile.

Le osservazioni sono state effettuate tra il 3 ed il 16 maggio 1990.

2124 Falchi pecchiaioli sono stati osservati a Cap Bon; 743 hanno intrapreso la traversata del Canale di Sicilia in direzione NE. Sullo Stretto di Messina sono stati osservati 4223 individui, il 48% dei quali il 9 maggio ed il 96% in 5 giorni.

Le nostre osservazioni non confermano i risultati di un precedente studio effettuato a Cap Bon. Durante la migrazione primaverile questo promontorio non sembra essere adatto per effettuare una realistica quantificazione del flusso migratorio dei rapaci sul Mediterraneo centrale.

Table I. Percentages of different species observed at Cap Bon (individuals observed and individuals crossing) and in the Straits of Messina from 3 to 16 May 1990.

	Honey Buzzard	Black Kite	Marsh Harrier	Egyptian Vulture	other sp.
Cap Bon (**)	66.8	14.7	6.9	4.8	6.8
Cap Bon (*)	85.7	6.1	2.0	1.1	5.1
S. of Messina	92.6	2.2	1.9	0.1	3.2

(**) Individuals observed. (*) Individuals crossing.

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