POST-FLEDGING BEHAVIOR AND OUTWARD MIGRATION OF A HYBRID GREATER \( \times \) LESSER SPOTTED EAGLE (Aquila clanga \( \times \) A. pomarina)

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The palearctic Greater Spotted Eagle (Aquila clanga) and the Lesser Spotted Eagle (A. pomarina) are sister species that, as mtDNA studies have estimated, diverged approximately one million years ago (Seibold et al. 1996). The world population of the Greater Spotted Eagle consists of some few thousand pairs distributed sparsely over a vast area from the Baltic Sea to the Pacific Ocean (Meyburg et al. 2001a). The approximately twenty thousand pairs of the Lesser Spotted Eagle breed mainly in Central and Eastern Europe (Meyburg et al. 2001b). The ranges of the two species overlap in Eastern Europe, and the sympatric area covers a large proportion of the Greater Spotted Eagle’s distribution range in Europe. Hybridization has recently been described in all countries in the sympatric area except Russia: Estonia (Lothmus and Väli 2001), Latvia (Bergmanis et al. 2001), Lithuania (Treinys 2005), Poland (Meyburg et al. 2005c), Belarus (Dombrovski 2005) and Ukraine (Zhezherin 1969).

To the best of our knowledge, no raptor hybrid has been studied using telemetry, other than hybrid falcons bred and used by falconers. As Greater and Lesser Spotted Eagles have very different wintering locations (Christensen and Sorensen 1989, Meyburg 1994a, b), and as their migration and wintering behaviors are markedly different (Meyburg 1994a, b), we were interested in determining whether the migration behavior of a young hybrid is intermediate between the two species.

The transition of birds of prey to independence is difficult to study (Brown and Amadon 1968), as both old and young birds stray ever farther from the nest site toward the end of the post-fledging period. There seems to have been only a single study in which the departure on migration, the break-up of the family, and the subsequent migration have been investigated by satellite tracking (Meyburg et al. 2005b).

METHODS

In northern Germany near Greifswald (54°03′ N, 13°29′ E), well outside the Greater Spotted Eagle’s breeding range (600 km west of the westernmost known breeding pairs of the Greater Spotted Eagle), a female Greater Spotted Eagle was found breeding with a Lesser Spotted Eagle male in the period 2003–2006. The pair fledged a single young in each of 2003, 2005, and 2006. DNA analysis of the 2003 and 2005 nestlings proved them to be hybrids (Helbig et al. 2005, Väli pers. comm.).

On 23 July 2005, the fully-feathered nestling (mass = 1862 g) of the mixed pair was equipped with a solar-powered satellite transmitter (platform transmitter terminal, PTT; Microwave Telemetry, Inc., Columbia, MD U.S.A.) with a mass of 20 g, or 1.07% of the bird’s body mass. We used the dho-gaza method (Bloom 1987, Meyburg et al. 2005a) to trap the male Lesser Spotted Eagle parent, using an adult White-tailed Sea Eagle (Haliaeetus albicilla) as decoy. The male (mass = 1387 g) was fitted with a solar-powered GPS PTT (Microwave Telemetry, Inc., Columbia,
with a mass of 35 g (2.52% of the bird’s body mass) to study habitat utilization, daily activity and migration. Unfortunately, we failed to trap the female Greater Spotted Eagle.

The PTT of the young eagle was programmed to be in continuous operation, given sufficient light level to generate power for the transmitter. The PTT of the male was programmed for 16 consecutive hourly GPS fixes per day, transmitted to Argos every third day, depending on sufficient light level. Both PTTs were fitted as back-packs, using Teflon ribbon (Bally Ribbon Mills, Bally, PA U.S.A.) to attach them to the birds.

We used the ArcView 3.3 (ESRI, Redlands, CA U.S.A.) Geographical Information System (GIS) to manage and analyze geographical data, and imported Argos and GPS locations into ArcView. We also used Google Earth’s satellite image program to plot locations, which were provided by Service Argos, Inc. (Toulouse, France), and to measure distances between locations. We attempted to determine the dependence of migratory behavior on the amount of precipitation, cloud cover, wind strength, and wind direction, by collecting weather data via the internet from the weather station nearest the birds at the time.

**RESULTS**

**Post-fledging Behavior and Family Break-up.** Until 13 August, the young eagle remained in the woodland eyrie and thereafter in its vicinity. As the first location was recorded on 23 September, the bird likely was there for most of the time but seldom in the open, so that the transmitter was not sufficiently charged.

On 24 September, at 2036 H, the bird was located 12.2 km east of the eyrie, clearly outside the male’s home range; at 2218 H, however, it was only 8.6 km distant from the eyrie. On 25 September, at 1102 H, the young eagle circled with the female over the eyrie woodland. The young bird begged vehemently. When the fledgling approached too close to the female, the latter did a sideways roll, as when defending against an aggressor. A few minutes later the male was last observed directly at the breeding site (J. Schwanbeck pers. comm.). In the night of 25/26 September, the young eagle was located in the immediate vicinity of the eyrie, so it spent its penultimate night before departure there, if not on the nest itself. On the following morning it was located 5.3 km west of the eyrie on the westerly margin of the male’s home range.

Departure on migration took place in the midday hours of 27 September; at 0920 H, the young was last located in the vicinity of the eyrie and at 1431 H at 26 km from the nest in an ENE direction, at least one day ahead of the female, which was last sighted on 28 September at 1158 H near the nest (J. Schwanbeck pers. comm.). The exact departure date of the male was not documented. The first

Figure 1. The autumn migration of the young hybrid Greater × Lesser Spotted Eagle and its Lesser Spotted Eagle father in Germany and Poland as determined by satellite telemetry. Dates of arrival and overnight roosting points en route are indicated.
location of the male after departure from the breeding territory, already at 142 km from the eyrie, was during the night of 28/29 September. It possibly departed immediately after the young eagle on the afternoon of 27 September, but more likely on the morning of 28 September (Fig. 1). The female probably departed on the afternoon of 28 September.

Migration Route. The young eagle and the adult male both migrated at first about 200 km in an easterly direction on similar flight paths, but not together (Fig. 1). Some 207 km east of its birthplace, the young eagle swung to the south and, after a further 130 km, towards the southwest. It held this course relatively unswervingly for 1277 km until it arrived in the neighborhood of Genoa and the coast (Fig. 2). Only during its crossing of the Alpine chain, in a region in Austria with mountains greater than 3000 m, did it take the shorter north-south route. From Genoa onwards, the migration followed the west coast of Italy to its southernmost point near Catanzaro in Calabria, where the bird arrived after a migratory flight of 2430 km on 27 October. The young eagle remained there until 31 October 2005, after which time no more locations were received, although the transmitter continued to transmit signals until 5 November, when transmissions ceased entirely.

Migration Speed. The young eagle flew for 25 d and rested on 6 d. On 17 d for which the overnight roosts could be located, the average distance covered was 99.5 km/d (range 23–209 km/d). Including the 8 d for which the daily flight distance could not be established in the overall calculation, we calculated an average of 97 km/d. We found no relationship between distance traveled and the weather conditions (wind speed, wind direction, cloud cover, and precipitation). Relatively good flying weather also prevailed on the rest days. The crossing of the Alps caused no delay.

DISCUSSION

Post-fledging Behavior and Family Break-up. Little is known about the distances young eagles move away from their nest during the post-fledging period. This aspect has never been studied in the two species considered here. In our study, the young hybrid eagle ventured considerably outside the home range of its father (54.4 km² in size, Meyburg et al. 2006) at the end of the post-fledging period. Concrete data on the family break-up are rare for eagles. In this mixed pair, the female was the last to depart, whereas the female was the first in a Greater Spotted Eagle family in Poland (Meyburg et al. 2005b). In both cases, all members of the family departed within a few days. Another satellite-tracked female in Poland departed on 13 September 2005. The male and its offspring, however, were still observed near the nest on 16 September 2005. In 2006, the same female already departed on 17 August (B.-U. Meyburg unpubl. data).

Migration Route. Very little has been published on whether adult eagles and their offspring migrate together or separately. The male and the young hybrid clearly migrated separately, even over the first 200 km where they followed similar flight paths.

A southwesterly migration direction in autumn is relatively common for Greater Spotted Eagles; for Lesser Spotted Eagles, however, it is extremely uncommon. Only very small numbers of Lesser Spotted Eagles are recorded in Italy on migration (e.g., Bijlsma 1987, Giordano 1991, Zalles and Bildstein 2000, Zenatello 2002). In contrast to Lesser Spotted Eagles, which winter almost without excep-
A young Greater Spotted Eagle, fitted with a transmitter by us on the western edge of the species’ range in eastern Poland, migrated in a south-southwest direction some 1687 km to Albania (Meyburg et al. 2005b). However, another young eagle from the same region migrated to the south in the direction of the Bosphorus, flying 1009 km to the Black Sea coast near Odessa in the Ukraine, until transmission ceased (Table 1). One adult Greater Spotted Eagle also migrated south-southwest and wintered in northwestern Greece on the Adriatic coast, while all other nine adult Greater Spotted Eagles fitted with transmitters migrated to Turkey or to Africa (Meyburg and Meyburg 2005).

The hybrid eagle, therefore, took a not atypical migration direction for a Greater Spotted Eagle, in contrast to that of all Lesser Spotted Eagles, although the initial departure in an almost easterly direction and abrupt change of direction to the southwest after 200 km migration were surprising. The young eagle’s direction on departure was perhaps influenced at first by that of other migrating Lesser Spotted Eagles.

**Migration Speed.** The average daily flight distance (74 km/d) of the hybrid corresponded more closely to that of four young Lesser Spotted Eagles (63, 75, 97, and 152 km/d) than to that of two young Greater Spotted Eagles (34 or 48 km/d) also fitted with transmitters (Table 1). Its migratory behavior could therefore be described as being intermediate between the two species’. Additional tracking of juvenile and adult hybrid eagles is necessary for us to better understand their migration and wintering behavior.

**COMPORTAMIENTO POSTERIOR AL EMLUMINAMIENTO Y MIGRACIÓN DE IDA DE UN HÍBRIDO ENTRE AQUILA CLANGA Y A. POMARINA**

**RESUMEN.**—Una cría híbrida entre un macho de *Aquila pomarina* y una hembra de *A. clanga* fue marcada con un transmisor satelital en el norte de Alemania. El águila joven se desplazó hasta 12.2 km desde su nido durante el periodo posterior al emplumamiento, y partió un poco antes que sus padres. El águila joven parece haber mostrado un comportamiento migratorio intermedio entre las dos especies. El híbrido escogió una ruta migratoria de salida hacia el sur-este que no es inusual en *A. clanga*, pero que es inusual en *A. pomarina*, a pesar de que la migración inicial tuvo una dirección hacia el este. Sin embargo, después de 200 km ocurrió un cambio abrupto en la dirección. El 27 de octubre, después de recorrer una distancia de 2430 km, el águila joven alcanzó la punta más sureña de Italia, donde la transmisión terminó. La distancia diaria promedio de vuelo observada (78.4 km)
se asemejó más a la de juveniles de A. pomarina (63, 75, 97 y 152 km/d) que a la de juveniles de A. clanga (34 y 48 km/d).

[Traducción del equipo editorial]

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