A case of aberrant post-breeding moult coinciding with nest desertion in a female Common Tern

In migratory birds, the timing of moult must be adjusted according to other important physiological processes, most importantly migration and reproduction, which are controlled by endogenous circannual rhythms (Gwinner 2003; Newton 2008). In response to interactions with various environmental cues, the timing and regulation of moult can vary among different individuals and populations of the same species (Holmgren & Hedenström 1995; Gwinner 2003).

In the Common Tern *Sterna hirundo*, it has been widely recognised that moult cycles are typically slow and differ among individuals (e.g. Hume 1993, Craik 1994, Malling Olsen & Larsson 1995, Koopman 1996, Wood & Ward 1996, Becker & Ludwigs 2004, Ward *et al.* 2004), resulting in a large overlap of nearly all age-dependent plumage features in the annual cycle (White & Kehoe 2001; Ward 2002). Post-breeding moult usually starts in or near the breeding area from early July to late August and is suspended during autumn migration (Becker & Ludwigs 2004). However, the presence of non-breeding-plumage features in adult breeders has not been documented before in this species.

Alexander Braasch

Alexander Braasch

94 & 95. Tomma, a ten-year-old female Common Tern *Sterna hirundo* in non-breeding plumage, Wilhelmshaven, Germany, June 2008. This individual, an established breeder at its natal colony, arrived in full breeding plumage in late April 2008 and was first observed showing characteristic non-breeding plumage features in mid June. This aberrant moult coincided with nest desertion during egg-laying.

Here we report a case of early post-breeding moult that coincided with nest desertion in an adult female Common Tern. Observations were carried out at the 'Banter See' Common Tern colony, situated within the harbour of Wilhelmshaven on the German North Sea coast. At this site, all fledglings have been marked with subcutaneously injected transponders since 1992; these transponders transmit individual ten-digit alphanumeric codes if activated by the antennae located on elevated resting platforms and temporarily around each incubated clutch. This automatic detection system allows us to follow individuals throughout their lifetime without the need for retrapping (for more

Table 1. Key parameters during the breeding life of female Common Tern *Sterna hirundo* 'Tomma' (for details see text), 2002–09 (data for first clutches only are given). In the 2009 breeding season, 'Tomma' did not breed; in 2010 she did not return to the colony.

	2002	2003	2004	2005	2006	2007	**2008**	2009
age	4	5	6	7	8	9	**10**	11
arrival date	21 Apr	22 Apr	22 Apr	15 Apr.	19 Apr	24 Apr	**24 Apr**	11 May
arrival mass (g)	–	134	126	–	131	124	**129**	129
partner	unknown	'Emmanuel'	'Emmanuel'	unknown	unknown	'Diego'	**'Diego'**	
laying date	02.06.	16.05.	14.05.	04.06.	31.05.	18.05.	**16.05.**	
clutch size	2	3	3	2	2	2	**1**	
chicks hatched	2	2	3	2	1	1	**0**	
young fledged	0	0	0	0	1	1	**0**	

– no data available

details see Becker & Wendeln 1997 and Becker *et al.* 2001).

During standard observations of parental feeding behaviour in mid June 2008 – the main chick-rearing period at this colony – the unusual appearance of one particular female (ID-code 00013ADE02, hereafter named 'Tomma'), attracted our attention. This ten-year old female, an established breeder at this, its natal colony, showed almost complete non-breeding plumage (a solid white patch on the forehead, a largely dark bill, and a dark carpal bar, together with worn primaries and missing tertials; plate 94). The moult must have taken place at the breeding site because Tomma was observed in full breeding plumage upon arrival at the colony and thereafter (GOG pers. comm.). No adult breeder has been documented in non-breeding plumage at this colony or, to our knowledge, at any other colony this early in the breeding season (cf. White & Kehoe 2001). Most of the time Tomma was observed resting in the immediate vicinity of a deserted nest containing one egg (table 1); this had earlier been assigned to her and her mate 'Diego' (ID-code 0001CE2ECD) through direct field observation (GOG pers. obs.). The clutch was deserted a few days after the egg was laid (in mid May), which is extremely rare in experienced breeders. In mid June, in the days following the first sighting of Tomma's non-breeding plumage, both she and her partner were observed regularly around the nest-site (plate 95) and the male still delivered prey items to Tomma, though at irregular intervals and the items were often refused. However, neither courtship behaviour displays nor copulation attempts were observed at this time. Both birds remained at the colony throughout June; Tomma was last recorded on 5th July, whereas her mate was recorded regularly at the colony until 11th August.

In 2009, Tomma returned relatively late to the Banter See colony (first registration on 11th May) and did not attempt to breed. Owing to the observation effort at the colony, it is highly likely that any tern in non-breeding plumage would have been noticed, so we presume that Tomma was in breeding plumage. Once again, however, she was observed in non-breeding plumage early in the season, in mid June (K. Klose pers. comm.). Her mate from the previous season, Diego, arrived almost three weeks earlier (first registration on 22nd April) and was observed with an unmarked female at a nest on 18th May. In 2010, Tomma did not return to the colony.

The recurrence of an early post-breeding moult in an individual of known age underlines the large possible overlap of plumages within a breeding population. Furthermore, it is a good example of how the timing of moult of an individual may be controlled by intrinsic physiological processes. Because moult is energetically costly (Payne 1972; Lindström *et al.* 1993), it is rare for moult to coincide with other energy-demanding events, such as breeding. Indeed, overlap between breeding and moult is minimised in most species (and all Laridae), and it is possible that a reproductive hormone may

inhibit moult (Dawson 2008). Several studies suggest that the hormone prolactin promotes parental care, and that production of it increases during incubation and chick rearing; levels of prolactin may also play a key role in the initiation of post-breeding moult (Dawson 2008). For example, in Common Starlings *Sturnus vulgaris* Dawson (2006) showed that the onset of moult was closely correlated with decreasing prolactin levels.

In the case of Tomma, we have no measurements of prolactin levels and thus can only speculate as to links between prolactin and state of moult. However, it is plausible that a decrease in prolactin concentrations associated with the curtailment of incubation behaviour might have led to the early onset of post-breeding moult. Tomma's breeding history also shows some unusual patterns (table 1) – from 2006 onwards her arrival date was delayed, while clutch size was limited to two eggs after 2005 – which might indicate poor individual condition (Becker *et al.* 2008). Such rare cases of aberrant moult add another source of uncertainty to the already highly flexible moult regime of adult Common Terns.

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Alexander Braasch, Institute of Avian Research 'Vogelwarte Helgoland', An der Vogelwarte 21, 26386 Wilhelmshaven, Germany; e-mail alexander.braasch@ifv-vogelwarte.de

Germán O. García, Laboratorio Vertebrados, Instituto de Investigaciones Marinas y Costeras (IIMyC), CONICET - Universidad Nacional de Mar del Plata, Funes 3250 (B7602AYJ) Mar del Plata, Argentina