



Short Note

Rare records of hypo- and hyper-pigmented individuals in two delphinid species off Madeira island

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Abstract

Sightings of anomalously all-white (leucistic) or all-black (melanistic) individuals are rare in nature, with information on hypo- and hyper-pigmented short-beaked common dolphins (*Delphinus delphis*) and Atlantic spotted dolphins (*Stenella frontalis*) being scarce in the literature. This study describes seven sightings of anomalously pigmented *D. delphis* and *S. frontalis* recorded off Madeira Island between 2014 and 2016. This includes: i) four records of a dark-pigmented *D. delphis* that lacked the distinctive hourglass colour (yellow) pattern, ii) two records of an all-white *D. delphis*, and iii) one record of an all-white *S. frontalis*. All records consisted of full-sized animals and were observed displaying the same behaviour as the other individuals in the same group, with no other delphinid species in the vicinities. The all-white individuals had a normal (dark) eye colouration, which indicated that the animals were not true albinos, but rather leucistic individuals. Despite inherent limitations of this condition, the adults observed in this study confirmed the potential longevity of these anomalously pigmented individuals in the wild. Similar reports as of those described here may provide a framework to better understand these animals. This study further highlights the value of sharing photographs via social media forums (e.g. Facebook).

Anomalously all-white or all-black individuals in the animal kingdom may occur due to a respective lack or excess of melanin in the body (Oetting et al., 1996; Slominski et al., 2004). Leucism refers to animals characterized by partial or total absence of pigmentation, that still possess normal eyes coloration (in contrast to albinism), and melanism to animals with an increased amount of black pigmentation (Fertl and Rosel, 2009). Such abnormal hypo- or hyper-pigmented animals are certainly rare in nature, and this aberrant pigmentation is still not fully understood.

All-white or all-black animals have been reported in a wide range of taxonomic groups covering aerial, terrestrial and aquatic vertebrates. These include birds (e.g. Jehl, 1985; Davis, 2007), bats (e.g. López-Wilchis and León, 2012; Tello et al., 2014), marsupials (e.g. Abreu et al., 2013), primates (e.g. Mahabal et al., 2012; Espinal et al., 2016), fishes (e.g. Veena et al., 2011; Bigman et al., 2016), or marine mammals (cf. Hain and Leatherwood, 1982; Fertl et al., 2004; Abreu et al., 2013 for a review). The latter group covers several species, including pinnipeds (e.g. Acevedo and Aguayo, 2008; Bester et al., 2008) and cetaceans (e.g. Fertl et al., 2004; Visser et al., 2004; Lydersen et al., 2013) alike. Abreu et al. (2013) conducted a comprehensive review about anomalous pigmentation in Neotropical mammals, and found that anomalous colouration is apparently rare in small terrestrial mammals, but it is much more common in microchiropterans and especially in cetaceans.

Although delphinids comprise the majority of the cetaceans' species (Mead and Brownell, 2005), records of this condition in the short-beaked common dolphin *Delphinus delphis* (given that most available information refers to *Delphinus* spp.) are largely limited to sightings of melanistic animals, recorded off New Zealand, California and France (Perrin et al., 1995; Visser et al., 2004), and one sighting of a leucistic animal off New Zealand (Stockin and Visser, 2005). Records in Atlantic spotted dolphins *Stenella frontalis* are rarer still, being limited to leucistic animals in the Azores (Fertl et al., 1999; dos Santos et al., 2016). This study adds information on anomalously pigmented *D. delphis* and *S. frontalis*, including: i) four records of a dark-pigmented *D. delphis* that lacked the distinctive hourglass colour (yellow) pattern, ii) two records of an all-white *D. delphis*, and iii) one record of an all-white *S. frontalis*.

The seven anecdotal sightings were recorded between 2 and 7 nmi off the southern coast of Madeira Island (NE Atlantic) in whale-watching platforms between 2014 and 2016. Photographs of the anomalous individuals were taken in most of the events (Fig. 1 and Fig. 2), and sightings data were collected in all encounters. The sightings data included date, position, age class, group size, behaviour, presence of calves, and presence of other species. Data from these seven records are presented in Tab. 1. In all records, the anomalously-pigmented animal was full-sized (i.e. adult), displayed the same behaviour as the rest of its group and had no calf. No other delphinid species was sighted in the vicinity of the records.

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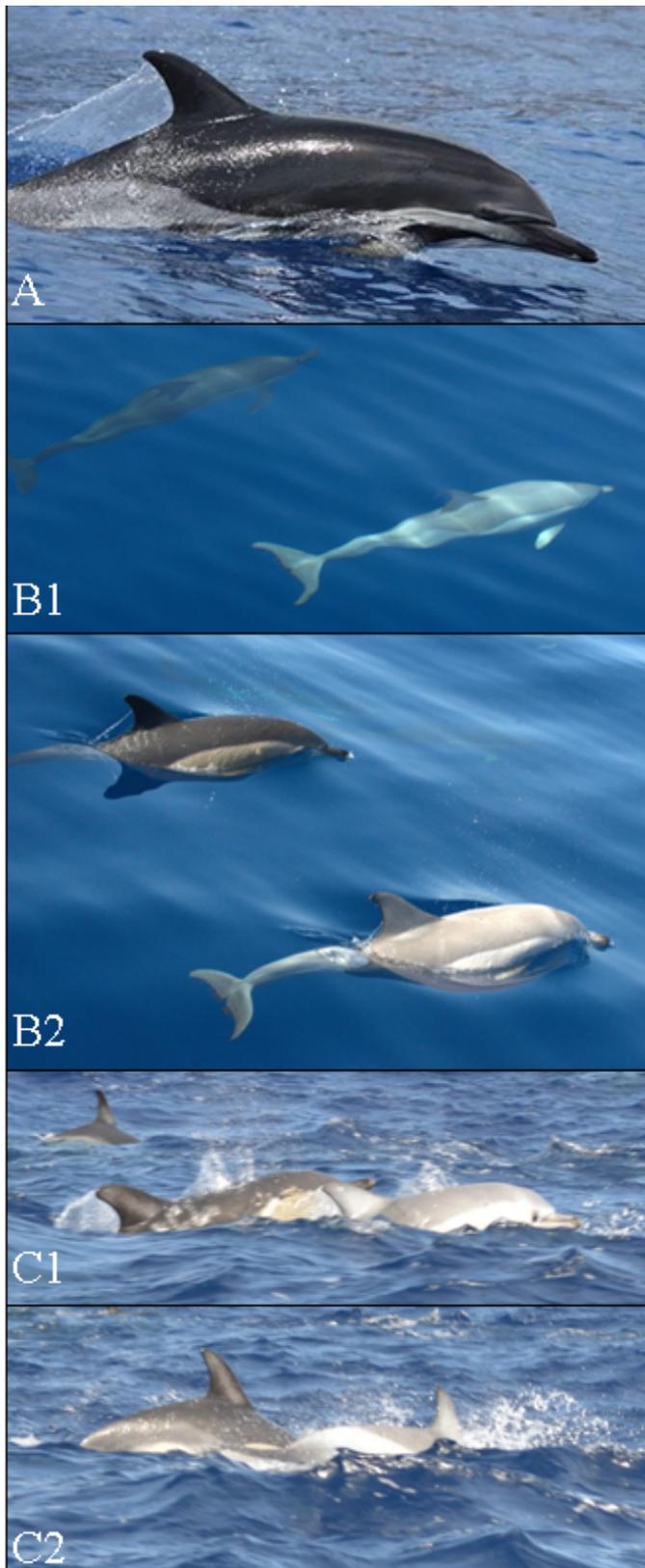


Figure 1 – Anomalously-pigmented adult *D. delphis* recorded off Madeira. A: hyper-pigmented (melanistic) individual (record #1; ©D. Sousa/H2O-Madeira). B1-2: hypo-pigmented (leucistic) individual (foreground; record #5) with a normally pigmented individual (background; ©F. Kutzschbach/LOBOSONDA). C1-2: hypo-pigmented (leucistic) individual (foreground; record #6) with a normally pigmented individual (background; ©F. Alves).

The all-white individuals (records #5–7) had a normal (dark) eye colouration (Fig. 1C1 and Fig. 2A), indicating the animals were not true albinos, but rather leucistic individuals. Although *D. delphis* and *S. frontalis* are widely distributed, from tropical to cool temperate wa-

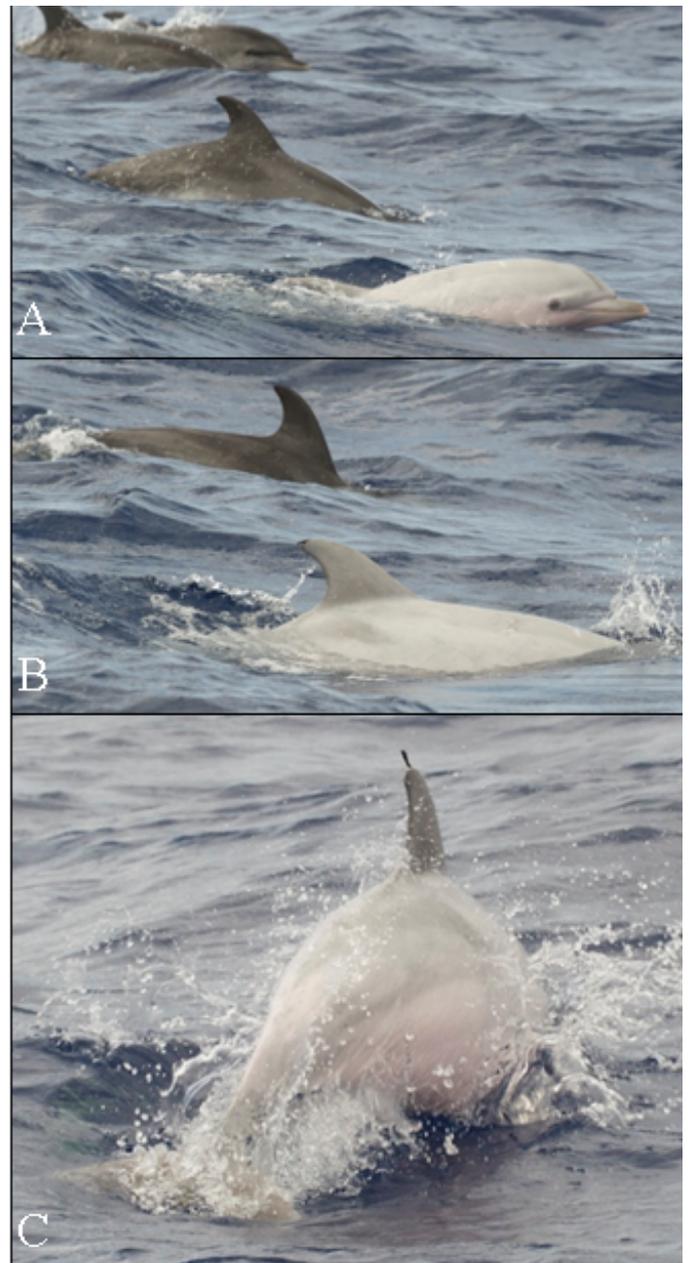


Figure 2 – (A-C): Hypo-pigmented (leucistic) *S. frontalis* (foreground; record #7) with a normally pigmented individual (background in A-B; ©A. Haas/LOBOSONDA).

ters of the Atlantic and Pacific Oceans in the former species and from tropical to warm temperate waters of the Atlantic in the latter, and are considered abundant throughout their range (Perrin, 2009a,b), photographs of leucistic animals are resumed to one *D. delphis* from New Zealand (Stockin and Visser, 2005) and to four *S. frontalis* in the Azores (dos Santos et al., 2016). Photographs of an anomalous pigmented *S. frontalis* from Brazil are noted by Lodi and Borobia (2013), but they refer to an atypical colouration condition known as piebald.

Lower survival rates should be expected from anomalously-pigmented cetaceans. This is based on the lack of counter-shading that may easily expose them to predators and to prey, on the lack of melanin that may increase chances of sunburn or skin cancer, on the reduced heat absorption that can affect thermoregulation, or on the reduced attractiveness that can affect mating success (Hain and Leatherwood, 1982; Fertl and Rosel, 2009; Robinson and Haskins, 2013; dos Santos et al., 2016). Despite probable limitations of these conditions described herein, the adults observed in the present study confirm the evident longevity of the individuals exhibiting these anomalies, as observed in other studies (e.g. Forestell et al., 2001; Tonay et al., 2012; Robinson and Haskins, 2013). Similar reports to those described here

Table 1 – Sightings data for the seven anomalously-pigmented delphinids recorded off Madeira Island. In all records, the anomalously-pigmented animal was full-sized, displayed the same behaviour as the rest of its group and had no calf. No other delphinid species was sighted in the vicinity of the records.

ID	Species	Abnormality	Date	Position	Group size	Observer	Type of record
#1	<i>D. delphis</i>	melanism	26-09-2015	32°41.93' N 17°10.51' W	45	D. Sousa, C. Moura (H2O-Madeira)	photograph
#2	<i>D. delphis</i>	melanism	28-11-2015	32°40.99' N 17°9.11' W	30	D. Sousa, C. Moura (H2O-Madeira)	visual
#3	<i>D. delphis</i>	melanism	18-03-2016	32°37.15' N 16°55.25' W	60	F. Alves, R. Ferreira (VENTURA)	video
#4	<i>D. delphis</i>	melanism	01-04-2016	32°39.20' N 17°4.63' W	50	L. Dias, R. Ferreira (VENTURA)	visual
#5	<i>D. delphis</i>	leucism	03-05-2014	32°40.70' N 17°8.63' W	100	F. Kutzschbach (LOBOSONDA)	photograph
#6	<i>D. delphis</i>	leucism	21-08-2015	32°35.48' N 16°33.53' W	90	F. Alves, L. Dias (VENTURA)	photograph
#7	<i>S. frontalis</i>	leucism	14-09-2014	32°39.25' N 17°10.00' W	150	A. Haas (LOBOSONDA)	photograph

may subsequently provide a framework to better understand the condition in wild populations.

The fact that the melanistic and leucistic *D. delphis* described here (records #1–4 and #5–6, respectively) were recorded from the same area (maximum 60 km apart) between 14 days (records #3–4) to 14 months (records #5–6), suggested these could be the same individuals. However, this was not possible to confirm by photo-identification, given that not all the dorsal fins were properly photographed or marked. In relation to *S. frontalis*, the leucistic animal described in this study (record #7) was compared with the four leucistic individuals recorded in the Azores (see dos Santos et al., 2016), being inconclusive due to the lack of individual marks. However, from an optimistic viewpoint, we cannot exclude the possibility that the animal described here was the same individual from one of the cases in the Azores. This is supported by the relative proximity of Madeira to the Azores archipelagos (ca. 1000 km) and by the absence of genetic structure in this species between these regions (Quérouil et al., 2010). Thus, the development of long-term photo-identification archives for these species in Madeira and adjacent regions would be useful to assess residency patterns or even future movements between geographic locations. Identification catalogues for *D. delphis* and *S. frontalis* in the region are currently inexistent given that these species occur in large numbers (Quérouil et al., 2010) and bear fewer distinctive marks, which would only allow identifying a small proportion of individuals. Although this could be a challenging task, photo-identification catalogues for these species have been successfully created in other regions (e.g. Herzing and Brunnick, 1997; Neumann et al., 2002), and a long-distance movement of *D. delphis* in the Mediterranean Sea have been documented based on the capture-recapture technique (Genov et al., 2012). Finally, given that record #1 had its origin in photographs found in a social media forum (Facebook) posted by a tour operator, we encourage researchers to follow similar sites of interest (e.g. whale-watching companies) and/or to establish cooperation protocols with such valuable sources. ☞

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