Online ISSN: 0718-1957
RBMO
Revista de Biología Marina y Oceanografía
Vol. 58(2): 116-121, 2023
<https://doi.org/10.22370/rbmo.2023.58.2.4222>

RESEARCH NOTE

Anomalous pigmentation in a dusky dolphin *Lagenorhynchus obscurus* from Golfo Nuevo, Argentinian Patagonia

Pigmentación anómala en delfín oscuro *Lagenorhynchus obscurus* del Golfo Nuevo, Patagonia Argentina

María Soledad Lindner[1*]

[1]Universidad Nacional de la Patagonia San Juan Bosco, UNPSJB, Blvd. Alte. Brown 3051, U9120 Puerto Madryn, Chubut, Argentina
*Corresponding author: msoledadlindner@hotmail.com

Abstract.- Anomalous pigmentation conditions occur with low frequency in marine mammals. Here is presented the first known record and resighting of a hypo-pigmented all-white dusky dolphin from Golfo Nuevo off Península Valdés, Argentinian Patagonia. The anomalously pigmented *Lagenorhynchus obscurus* was observed three times between 2016 and 2018. Images suggest that this could be a case of a leucistic dusky dolphin, apparently a single individual. The hypo-pigmented individual was estimated to have reached adult body size, and was probably sexually mature. More research is required for a proper understanding of the effect on behavioral, ecological and physiological conditions.

Key words: Hypo-pigmentation, leucism, dusky dolphin, Argentinian Patagonia

INTRODUCTION

All-white or all-black animals have been reported in a wide range of taxonomic groups, covering aerial, terrestrial and aquatic vertebrates (Alves *et al*. 2017). Anomalous pigmentation conditions occur with low frequency in marine mammals (Hain & Leatherwood 1982, Fertl *et al*. 1999, 2004; Abreu *et al*. 2013, Lodi & Borobia 2013, Fertl & Rosel 2018). Mammalian color is almost entirely dependent on presence (or absence) of the pigment melanin in the skin, hair and eyes (Fertl & Rosel 2018).

Hypo-pigmented (anomalously white) individuals are often presumed to be true albinos; however, pigmentation patterns should not be the only criterion (Fertl & Rosel 2018). Atypical colorations have been categorized as: (i) albinism, a complete lack or reduction of pigmentation (*i.e.*, hypopigmentation) in the eyes, skin and hair; (ii) leucism, a reduced pigmentation in all the body except the eyes, resulting in dark-eyed anomalously white individuals; (iii) melanism, an increased amount of black pigmentation; and (iv) piebaldism, characterized by the localized absence of pigment resulting in irregular patches of light color on an animal that otherwise has normal coloring and patterning (Slominski *et al*. 2004, Acevedo & Aguayo 2008, Lodi & Borobia 2013, do Santos *et al*. 2016, Fertl & Rosel 2018, Methion & Díaz-López 2019).

Anomalously white individuals have been reported for 25 cetacean species (Fertl *et al*. 1999, Fertl *et al*. 2004, Abreu *et al*. 2013, Fertl & Rosel 2018) worldwide. Tsutsui *et al*. (2001) described the first record of fourteen Pacific white-sided dolphins (*Lagenorhynchus obliquidens*), a dusky dolphin "sister species", having anomalous colour patterns. Van Waerebeek & Würsig (2018) mentioned that heavily pigmented specimens of dusky dolphins are found off Peru and Argentina. Additionally, five Peruvian dusky dolphins and one specimen from Southwestern Africa showed anomalous piebald pigmentation; a condition probably equivalent to partial albinism or piebaldism (Van Waerebeek, 1993). However, to our knowledge, there are no records of hypo-pigmented all-white dusky dolphins (*Lagenorhynchus obscurus*).

Lagenorhynchus obscurus has been renamed as *Sagmatias obscurus*; evidence suggests that the six species currently assigned to *Lagenorhynchus* do not form a monophyletic group (Vollmer *et al*. 2019). However, evidence is still needed to clarify the phylogenetic relationship between species. So, for the purposes of this study the traditional nomenclature continues to be used.

The normal color pattern of the dusky dolphin has a bluish black to dark gray dorsal field contrasting with the white belly, light gray thoracic patch and two-pronged flank patch, dark lips and eye patch standing out, the falcate dorsal fin is two-toned with a dark leading edge, and the linear dorsal flank blaze does not extend farther anteriorly than about mid-body (Van Waerebeek & Würsig 2018).

The dusky dolphin is a small dolphin inhabiting coastal temperate waters in the southern hemisphere (Degrati *et al.* 2012) and in particular off southern South America, southern Africa, New Zealand, Australia, and around several austral oceanic islands (Van Waerebeek *et al.* 2010). No abundance estimates are available at the scale of an entire population. However, dusky dolphins are the most common small cetacean on the Patagonian Shelf (Schiavini *et al*. 1999). Dusky dolphins that live in waters of the extensive continental shelf off Argentina, forage cooperatively not only on small schooling fishes during the day but also on *Loligo* squid (Van Waerebeek & Würsig 2018). Observations in Golfo Nuevo indicate that during winter, dusky dolphins were observed in coordinated diving, apparently in a feeding activity, contrasting with the surface feeding observed during summer (Degrati *et al*. 2012).

Golfo Nuevo (42°20'-42°50'S; 64°20'-65°00'W) is the southern gulf of Península Valdés (PV). PV is a Natural Protected Area that was declared Natural World Heritage Site by UNESCO in 1999 and is considered as an area of exceptional universal value due its marine biodiversity.

The objective of this note was to add information of an anomalously pigmented *L. obscurus* register and the first known case and resighting of an all-white dusky dolphin in Golfo Nuevo off Península Valdés Peninsula, Argentinian Patagonia.

Materials and methods

The hypo-pigmented *L. obscurus* individual was observed three times between 2016 and 2018. Occasional observations were recorded between 2 and 8 nautical miles off the coast of Puerto Madryn city, Golfo Nuevo (Argentina) (Fig. 1), from a private boat under a recreational use. Photographs and videos of the anomalous white individual were taken during all encounters. Additional information could be collected from the images and videos, as date, hour, position and behavior. Digital registers were carefully analyzed for body condition analysis and individual identification. Individual identification of an anomalously white *Lagenorhynchus obscurus* dolphin off Golfo Nuevo was performed to discuss the occurrences and the first record of a hypo-pigmented individual.

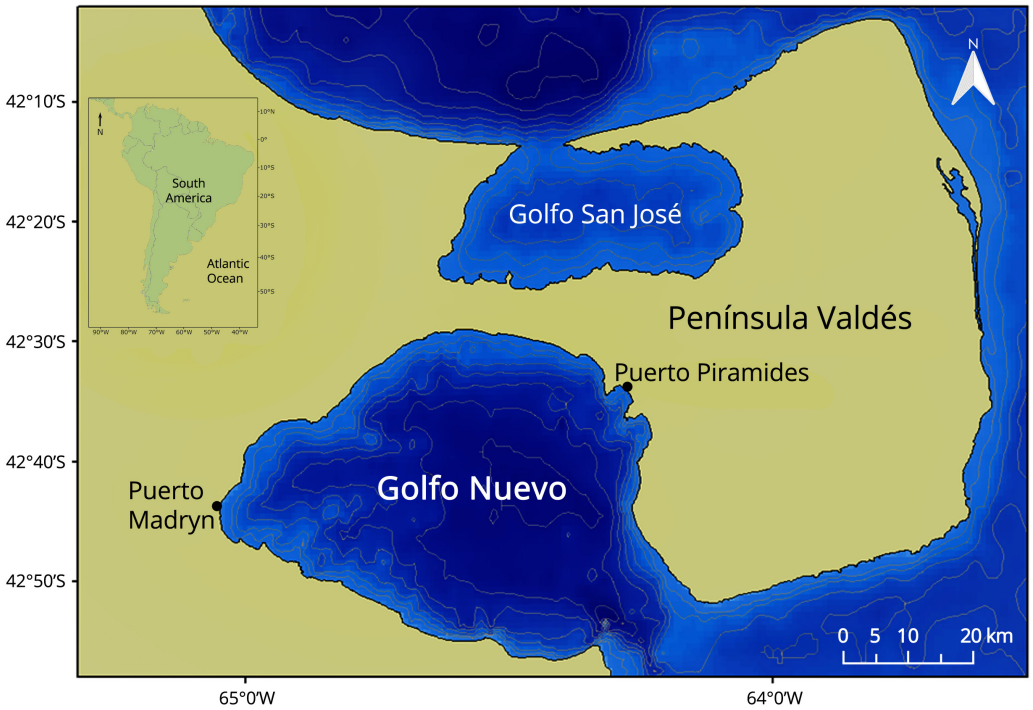

Figure 1. Study area showing the location of sampling sites in Golfo Nuevo, Península Valdés, Chubut, Argentinian Patagonia / Área de estudio mostrando la ubicación de los sitios de muestreo en Golfo Nuevo, Península Valdés, Chubut, Patagonia argentina

Results and discussions

The first observation of the hypo-pigmented *L. obscurus* individual was registered on 05 March 2016 during the morning (42°41'05.0"S; 64°56'29.6"W; 44.5 m depth). The adult all-white dolphin was traveling and socializing in a pod of more than two hundred dusky dolphins. Common dolphins (*Delphinus delphis*) were also observed in the same pod. Both species were swimming in the same direction, with dusky dolphins exhibiting their typical aerial display (Van Waerebeek & Würsig 2018).

The second encounter occurred on 15 March 2016 during the afternoon. The all-white individual was also travelling in a large pod of dusky dolphins; no other species were observed. Some individuals of the pod displayed aerial behaviors.

The third sighting was registered two years later, at noon on 17 February 2018. The anomalously pigmented dolphin was observed in a dusky dolphin group actively feeding at the surface, accompanied by great seabird activity, such as kelp gull (*Larus dominicanus*), greater shearwater (*Puffinus gravis*), sooty shearwater (*Puffinus griseus*) and black-browed albatross (*Thalassarche melanophris*). No other dolphin species were observed.

The dolphin with the anomalous color pattern maintained constant close association with the normally pigmented adults of its group. In all records, the anomalously-pigmented animal was adult sized, displayed the same behavior as the rest of its group and had no calf. The dolphin was an adult-colored white with small light grey patches along the body. The beak and forehead of the blowhole were light grey. The lips of the mouth, dorsal fin and eye patch were outlined in a grey color (Fig. 2). No pink coloration was observed anywhere on the body.

The detailed examination of the images suggests us that this is a case of a leucistic dusky dolphin and the three observations seem to involve the same individual (Fig. 3).

Figure 2. Hypo-pigmented dusky dolphin (*Lagenorhynchus obscurus*), colored white with small light grey patches along the body, recorded off Golfo Nuevo, Argentinian Patagonia: a) 05 March 2016, surfacing with eye open; b) 15 March 2016, surfacing with eye closed; c) 05 March 2016, surfacing and showing left side dorsal fin; and d) 17 February 2018, surfacing and showing left side dorsal fin and back up to the peduncle. Photos by María Soledad Lindner / Delfín oscuro hipo-pigmentado (*Lagenorhynchus obscurus*), color blanco con pequeños parches grises claro a lo largo del cuerpo, registrado en el Golfo Nuevo, Patagonia Argentina: a) fotografiado el 05 de marzo 2016, en superficie con los ojos abiertos; b) fotografiado el 15 de marzo 2016, en superficie con los ojos cerrados; c) fotografiado el 05 de marzo 2016, en superficie y registrando el lateral izquierdo de su aleta dorsal; y d) fotografiado el 17 de febrero 2018, en superficie y registrando el lateral izquierdo de su aleta dorsal y dorso hasta el pedúnculo. Fotos de María Soledad Lindner

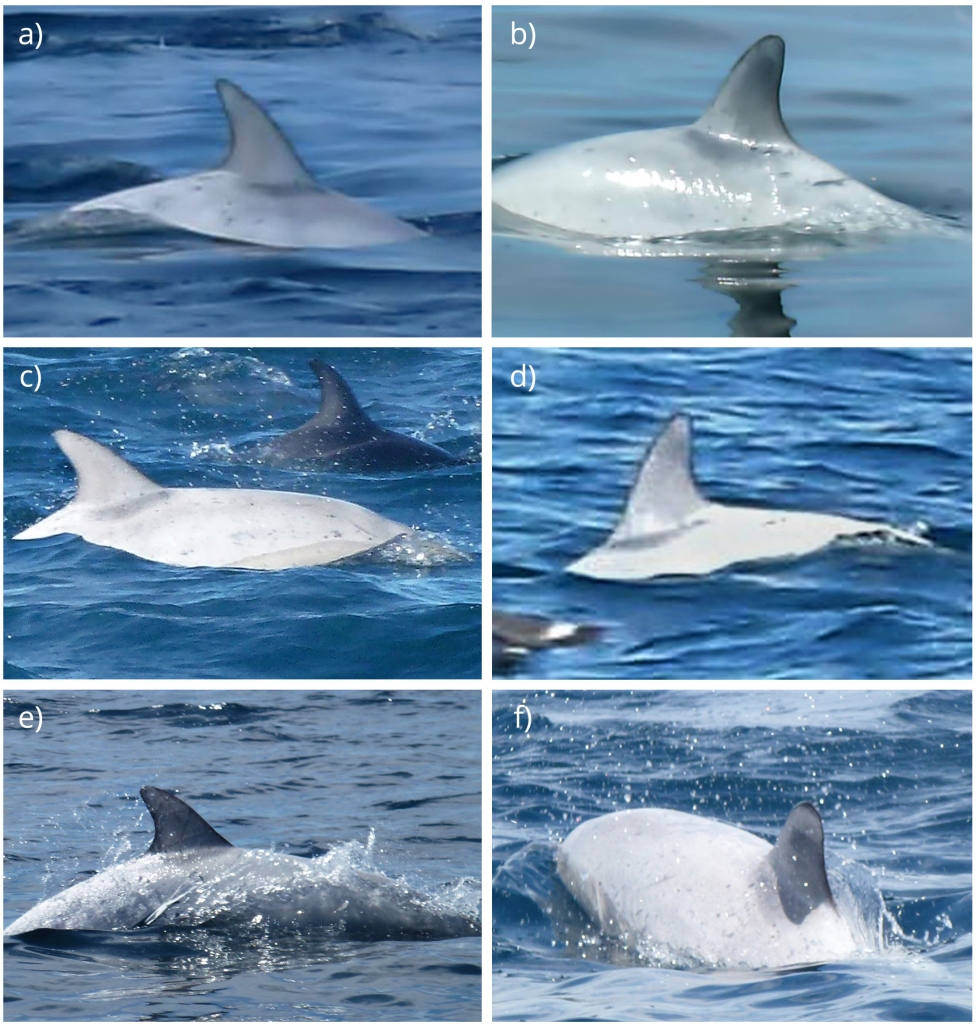

Figure 3. Anomalously white dusky dolphin (*Lagenorhynchus obscurus*), with small light grey patches along the body, recorded off Golfo Nuevo, Argentinian Patagonia: a) 05 March 2016, surfacing and showing the right side dorsal fin; b) 05 March 2016, surfacing and showing the left side dorsal fin; c) 15 March 2016, surfacing and showing the right side dorsal fin with a normally pigmented individual; d) 15 March 2016, surfacing and showing the left side dorsal fin; e) 17 February 2018, surfacing and showing the right side dorsal fin; and f) 17 February 2018, surfacing and showing the left side dorsal fin. Photos by María Soledad Lindner / Delfín oscuro anómalamente blanco (*Lagenorhynchus obscurus*), con pequeños parches color gris a lo largo de su cuerpo, registrado en el Golfo Nuevo, Patagonia Argentina: a) 05 de marzo 2016, en superficie y mostrando el lado derecho de la aleta dorsal; b) 05 de marzo 2016, en superficie y mostrando el lado izquierdo de la aleta dorsal; c) 15 de marzo 2016, en superficie y mostrando el lado derecho de la aleta dorsal junto a un individuo de pigmentación normal; d) 15 de marzo 2016, en superficie y mostrando el lado izquierdo de la aleta dorsal; e) 17 de febrero 2018, en superficie y mostrando el lado derecho de la aleta dorsal; y f) 17 de febrero 2018, en superficie y mostrando el lado izquierdo de la aleta dorsal. Fotos de María Soledad Lindner

In interview with a dolphin watching boat captain, he mentioned having seen several times over the years a white dusky dolphin. He described the individual as an adult dolphin, because he had observed it copulating with another dusky dolphin (F. Alonso pers. comm., February 2019)[1]. The absence of photographs of these observations does not allow us to ascertain whether it was the same individual, but considering the rarity of leucistic dolphins, the probability is considered high.

Colouration of aquatic organisms is subject to several different selection pressures and has functional significance (Caro *et al.* 2011). For example, countershading is a cryptic mechanism, prominent markings function in intraspecific communication, and white markings have an effect on prey acquisition (Caro *et al.* 2011). So, abnormal coloration could have an effect on the survival of the individuals. Nevertheless, there is not much information about the implications or costs associated to hypo-pigmentation. Some authors suggest that a lower survival rate should be expected (Alves *et al.* 2017), but they provide no evidence to support this conjecture.

[1] Fernando Alonso. Iris Project, Dolphin-watching. Av. Blvd. Brown 1855, (9120) Puerto Madryn, Chubut, Argentina.

Anomalously pigmented individuals may be more susceptible to predation and more exposed to prey, conditions that can be detrimental for survival (Pawelek & Körner 1982, Methion & Díaz López 2019). Some studies suggest that the lack of melanin may increase the chances of sunburn or skin diseases, and the interactions with conspecifics could be impaired, thus, affecting mating success (Acevedo & Aguayo 2008, Robinson & Haskins 2013, do Santos *et al*. 2016, Alves *et al*. 2017, Fertl & Rosel 2018). However, there is no evidence for any of these hypothetical dangers specifically on delphinids. Odontocetes should be considered to hunt largely acoustically and much less visually, so colouration would not suppose any detrimental condition. Additionally, the hypo-pigmented individual observed in this study reached adult body size and, presumably, was sexually mature.

More research on anomalously pigmented dolphins is required for a proper understanding of the effect on behavioral, ecological and physiological conditions. On the other hand, given that it seems to be the same individual, encountered in a limited area, the development of long-term photo-identification monitoring would be useful to describe habitat use patterns and the existence of site fidelity of these dolphins in Golfo Nuevo, Argentinian Patagonia.

Acknowledgments

I thank J. I. Mitilli, dolphin watching captain, for his logistic support and collaboration, and F. Alonso for his observation comments. I also thank the reviewers for their valuable comments and suggestions to improve this manuscript.

Literature cited

Abreu MSL, R Machado, F Barbieri, NS Freitas & LR Oliveira. 2013. Anomalous colour in Neotropical mammals: A review with new records for *Didelphis* sp. (Didelphidae, Didelphimorphia) and *Arctocephalus australis* (Otariidae, Carnivora). Brazilian Journal of Biology 73(1): 185-194.

Acevedo J & M Aguayo. 2008. Leucistic south American sea lion in Chile, with a review of anomalously color in otariids. Journal of Marine Biology and Oceanography 43(2): 413-417.

Alves F, R Ferreira, L Dias, C Nicolau, D Sousa, C Moura, C Gomes & A Dinis. 2017. Rare records of hypo- and hyper-pigmented individuals in two delphinid species off Madeira Islands. Hystrix, the Italian Journal of Mammalogy 28(1): 116-118. <https://doi.org/10.4404/hystrix>

Caro T, K Beeman, T Stankowich & H Whitehead. 2011. The functional significance of colouration in cetaceans. Evolutionary Ecology 25: 1231-1245. <doi: 10.1007/s10682-011-9479-5>

Degrati M, SL Dans, GV Garaffo & EA Crespo. 2012. Diving for food: A switch of foraging strategy of dusky dolphins in Argentina. Journal of Ethology 30(3): 361-367. <https://doi.org/10.1007/s10164-012-0333-1>

Fertl D & P Rosel. 2018. Albinism. In: Würsig B, JGM Thewissen & KM Kovacs (eds). Encyclopedia of marine mammals, pp. 20-21. Elsevier, San Diego.

Fertl D, LT Pusser & JJ Long. 1999. First record of an albino bottlenose dolphin (*Tursiops truncatus*) in the Gulf of Mexico, with a review of anomalously white cetaceans. Marine Mammal Science 15(1): 227-234. <https://doi.org/10.1111/j.1748-7692.1999.tb00794.x>

Fertl D, NB Barros, RA Rowlett, S Estes & M Richlen. 2004. An update on anomalously white cetaceans, including the first account for the pantropical spotted dolphin (*Stenella attenuata graffmani*). Latin American Journal of Aquatic Mammals 3(2): 163-166. <https://doi.org/10.5597/lajam00061>

Hain JHW & S Leatherwood. 1982. Two sightings of white pilot whales, *Globicephala melaena*, and summarized records of anomalously white cetaceans. Journal of Mammalogy 63: 338-343.

Lodi L & M Borobia. 2013. Anomalous coloration in an Atlantic spotted dolphin (*Stenella frontalis*) from Southeastern Brazil 17(2): 1-3. <https://doi.org/10.14210/bjast.v17.n2.pNB1-3>

Methion S & B Díaz-López. 2019. First record of atypical pigmentation pattern in fin whale *Balaenoptera physalus* in the Atlantic Ocean. Diseases of Aquatic Organisms 135(2): 121-125.

Pawelek JM & AM Körner. 1982. The biosynthesis of mammalian melanin: The regulation of pigment formation, the key to disorders such as albinism and piebaldism, may also offer some clues for the treatment of melanoma. American Scientist 70: 136-145.

Robinson KP & GN Haskins. 2013. Rare sighting of an anomalously white harbour porpoise (*Phocoena phocoena*) in the Moray Firth, north-east Scotland. Marine Biodiversity Records 6: e23. <https://doi.org/10.1017/S1755267212001339>.

Santos RP, S Simião, P Madruga, AS Mendonça, R Seitre & JN Gomes-Pereira. 2016. Anomalously white Atlantic spotted dolphins (*Stenella frontalis*, Cuvier, 1892) off the Azores. Aquatic Mammals 42(2): 245-252. <https://doi.org/10.1578/AM.42.2.2016.244>

Schiavini A, SN Pedraza, EA Crespo, R González & SL Dans. 1999. Abundance of dusky dolphins (*Lagenorhynchus obscurus*) off North and Central Patagonia, Argentina, in spring and a comparison with incidental catch in fisheries. Marine Mammal Science 15(3): 828-840. <https://doi.org/10.1111/j.1748-7692.1999.tb00845.x>

Slominski A, DJ Tobin, S Shibahara & J Wortsman. 2004. Melanin pigmentation in mammalian skin and its hormonal regulation. Physiological Reviews 84(4): 1155-1228. <doi: 10.1152/physrev.00044.2003. PMID: 15383650>

Tsutsui S, M Tanaka, N Miyazaki & T Furuya. 2001. Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) with anomalous colour patterns in Volcano Bay, Hokkaido, Japan. Aquatic Mammals 27(2): 172-182.

Van Waerebeek K. 1993. External features of the dusky dolphin *Lagenorhynchus obscurus* (Gray 1828) from Peruvian waters. Estudios Oceanológicos 12: 37-53.

Van Waerebeek K & B Würsig. 2018. Dusky dolphins. In: Wursig B, JGM Thewissen & KM Kovacs (eds). Encyclopedia of marine mammals, pp. 277-280. Elsevier, San Diego.

Van Waerebeek K, R Leaper, AN Baker, V Papastavrou, D Thiele, K Findlay, G Donovan & P Ensor. 2010. Odontocetes of the Southern Ocean Sanctuary. Journal of Cetacean Research and Management 11(3): 315-346.

Vollmer NL, E Ashe, RL Brownell Jr, F Cipriano, JG Mead, RR Reeves, MS Soldevilla & R Williams. 2019. Taxonomic revision of the dolphin genus *Lagenorhynchus*. Marine Mammal Science 35: 957-1057. <https://doi.org/10.1111/mms.12573>

Received 30 September 2021
Accepted 10 May 2023