

Fifty Shades of Gray: The First Leucistic Bottlenose Dolphin (*Tursiops truncatus*) Sighting off the Cedar Keys, Florida, Gulf of Mexico

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Melanin is the group of pigments found in the skin of animals, and the quantity determines coloration patterns. Variations in the production of melanin has been linked to different disorders (for a review, see Braun-Falco et al., 2000). For example, hypopigmentation, those with reduced melanin production, include albinism (total absence of pigmentation; skin is white and eyes are shades of red) and leucism (deficiency of pigmentation; skin is abnormally pigmented often in shades of white or tan and eyes are a normal color) (Fertl & Rosel, 2018; Olson & Allen, 2019; Hauser-Davis et al., 2020; Walsh, 2020).

Leucism in marine mammals is rare as reported in the literature. Olson & Allen (2019) found 114 records of leucism in class Mammalia, 33 of which are in order Carnivora, with most reports (18) belonging to family Mustelidae, followed by 12 references to family Otariidae and two references to family Phocidae. In marine mammals, atypically white individuals have been reported in 33 marine mammal species (Fertl & Rosel, 2018), and a review of the dolphin literature found 14 reports of leucism in five dolphin species worldwide from 1929 to 2019 (Hauser-Davis et al., 2020). Anomalously colored marine mammals are often met with wide public attention when observed because of their rarity, which is also often reported in local news and media. For example, a hypopigmented bottlenose dolphin first seen in Clearwater, Florida, in 2021 (“Shark-Scarred Rare White Dolphin,” 2021) garnered additional media attention when it was sighted again in 2022 (“Rare White Dolphin Spotted in Clearwater Canal,” 2022). These publicly reported observations of abnormally colored marine mammals included in news articles are usually not published in peer-reviewed literature, and neither of the reviews on leucism (Olson & Allen, 2019; Hauser-Davis et al., 2020) incorporated news articles into their searches, which may be a source for additional cases of leucism.

In this paper, we report the first confirmed sighting of an anomalously colored adult female bottlenose dolphin (*Tursiops truncatus*) in the northeastern Gulf of Mexico (GOM). The light brown-to-tan dolphin was nursing a normally colored calf north of the Cedar Key islands in Florida. The area of the Cedar Keys (29.096944, -83.066111) comprises five major islands, numerous smaller islands, and wetland areas connected to the mainland off the northwest coast of Florida. The public in this area have provided multiple unconfirmed reports of a seasonal transient anomalously colored bottlenose dolphin observed only in the winter months (January and February) since 2001 when dedicated dolphin photo-identification research commenced in the Cedar Keys. The last unconfirmed sighting reported by the public of an unusually colored dolphin in the area was in January 2022. In addition, Steinhatchee, Florida, which is a town located on the GOM north-northwest from the Cedar Keys area (Figure 1), was the site of multiple live captures of dolphins in the 1960s for the purposes of selling them to the live animal entertainment industry (“Blonde Dancing Dolphin Getting Mate,” 1967; “Mr. Nevin Stuart Obituary,” 2014). Some of these dolphins were noted as “blonde” in color in news articles about their capture and subsequent lives spent under human care (“Blonde Dancing Dolphin Getting Mate,” 1967; Walsh, 2020). These dolphins are not all mentioned in the scientific literature (they are mentioned briefly in Walsh, 2020) but could indicate a historical source of the genetic anomaly of leucism in bottlenose dolphins.

Steinhatchee, Florida, is ~65 km northwest of the Cedar Keys (Figure 1), within the travel range of an inshore bottlenose dolphin (Shane et al., 1986). The town sits on the Steinhatchee River, which discharges into the GOM and has a suspected resident population of dolphins. Mr. Nevin Stuart, a long-time Steinhatchee resident,

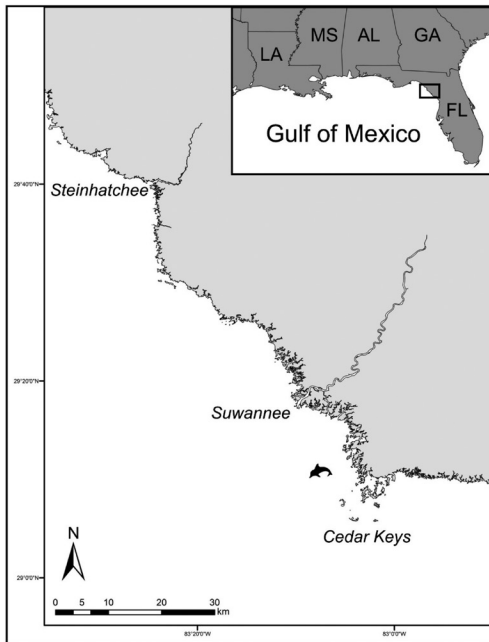


Figure 1. Map of the area with the Cedar Keys, Suwannee, and Steinhathee areas labeled. The location of the 15 July 2017 sighting is noted by the dolphin icon.

captured at least two (likely three) dolphins identified as “albino” (“Mr. Nevin Stuart Obituary,” 2014) in the waters surrounding Steinhathee prior to the Marine Mammal Protection Act of 1972. One of these anomalously colored dolphins, named “Lilly,” was a ~5-y-old female bottlenose dolphin when captured in 1964 (Walsh, 2020) and was sold to Marineland in Marineland, Florida, where she lived until her death in 2009. It is unlikely that she was a true albino but likely leucistic because her eyes were not red-hued and her skin was light tan in color, indicating the presence of some pigment-producing melanin (“Blonde Dancing Dolphin Getting Mate,” 1967; Walsh, 2020). She was known as the “blonde” or “champagne” dolphin due to the light color of her eyes and was often dubbed “Lilly Champagne” (“Blonde Dancing Dolphin Getting Mate,” 1967). Her coloration, according to news reports, was attributed to a recessive genetic trait, but no genetic studies were ever published for her case (“Rare ‘Blonde’ Dolphin at Marineland Dies at Age 47,” 2009). In 1967, Mr. Stuart captured a male bottlenose dolphin of similar coloration in the same area near Steinhathee, which was also brought to Marineland to be a companion of Lilly, though they never had offspring (“Blonde Dancing Dolphin Getting Mate,” 1967; Walsh, 2020).

Given that these animals had similar coloration and were captured from the same area of the GOM, it is possible that they were genetically related. In wild populations of bottlenose dolphins, adult females rarely associate with their sons while reproductively receptive, possibly to reduce inbreeding (Wallen et al., 2017). We do not have data on any association patterns of these dolphins while in the wild nor at Marineland. This male “blonde” dolphin had offspring with a normally colored dolphin while at Marineland and all were typically colored. Lilly did not have any offspring while in captivity (“Rare ‘Blonde’ Dolphin at Marineland Dies at Age 47,” 2009), and her reproductive history while in the wild is not known.

The Cedar Key Dolphin Project (CKDP) is a 501(c)(3) nonprofit organization officially founded in 2017 (EIN: 82-1600242). Researchers from the CKDP have been conducting research on the bottlenose dolphin population in the region of the Cedar Keys (29.132, -83.057) since 2001, focusing on population dynamics, foraging ecology, and social structure. On 5 July 2017, at 1146 h (EDT), while conducting dolphin photo-identification surveys, researchers encountered a group of dolphins, including a suspected leucistic individual, slightly offshore from the Cedar Keys area (29.176, -83.121; Figure 1). Sighting data were collected using methods described in Gazda et al. (2005). Briefly, observations were made from a 4.26-m Wahoo boat with an 80-hp Yamaha outboard motor. Individual dolphins were photographed using a Nikon camera fitted with an 80-350 mm zoom lens. Once a dolphin or dolphin group was encountered, the markings on the dorsal fin were photographed for individual identification (Caldwell, 1955; Würsig & Würsig 1977) using the methods described by Defran et al. (1990). Individuals were included in the group if they were within 10 m of any other group member (Smolker et al., 1992).

The group of dolphins encountered during this sighting consisted of 17 individuals, including two calves. Due to the water clarity, we were able to sex five of the adults, which were all female. No males were positively confirmed. Two of the 17 dolphins did not have high enough quality photographs to assign a code or individual identification, to them. The abnormally colored dolphin (Figure 2a & b) was assigned an identification code of “MNOS.” Of the non-calf dolphins identified in the sighting, five are considered resident; the other 10 are considered transients and were only seen during this sighting, including MNOS (Gubbins, 2000). The group was traveling in a generally straight and northerly direction, with occasional foraging and socializing



Figure 2. Images from the 15 July 2017 sighting: (a) MNOS behind the normally colored calf she was observed nursing; and (b) MNOS traveling in the foreground of the picture, next to the dolphin TEOS, a normally colored dolphin. (Photos taken by S. Gazda under NOAA Permit #14450, now #21938)

behaviors. The group was tightly associated, with most group members within one adult body length of each other while traveling. The group was observed for ~30 min, during which time we observed repeated instances of the abnormally colored adult dolphin nursing a normally colored calf (Figure 2a).

Abnormal pigmentation of the skin is most often attributed to genetics (Fertl & Rosel, 2019), though it can be caused by other factors such as pollution, systemic infection, scarring, or other etiological factors (Walsh, 2020). Coloration patterns of a species are usually thought to arise from a selective advantage such as predator avoidance or hiding from prey. Within cetaceans, there is no evidence of background matching, which is a type of camouflage with a color pattern that blends in with the

environment (Caro et al., 2011). However, cetaceans utilize a camouflage called countershading that is characterized by having lighter coloration ventrally and darker coloration dorsally (Caro et al., 2011). Hypopigmentation is suspected to negatively affect the survival and reproduction of marine mammals by reducing countershading, thus making the animal more susceptible to predators, reducing mating success, and having a reduced fitness if the coloration pattern is due to inbreeding (Hauser-Davis et al., 2020). In a 2020 review of leucism in delphinid species, Hauser-Davis et al. found that cetaceans with leucism were surviving until adulthood, indicating that they may not be more susceptible to predation, although more studies are needed. This review did not find any previous reports on sightings of leucistic dolphins with offspring.

Given that our sighting included the hypopigmented dolphin nursing a normally colored calf, the abnormal coloration does not necessarily negatively affect the reproductive success of these animals, though it may affect their foraging success due to difference in countershading (Caro et al., 2011; Hauser-Davis et al., 2020). This dolphin was also clearly an adult, so our sighting also supports the ability of these suspected leucistic cetaceans to reach adulthood. Because there are reports of multiple hypopigmented dolphins in this area of the northeastern GOM (Walsh, 2020), it is possible that this trait is due to inbreeding. More research, including a genetic component (part of the long-term research goals of the CKDP), is needed to determine the relatedness of the dolphins in the Cedar Keys and Steinhatchee locations and to elucidate the possible relative fitness of these animals. Although Lilly never produced offspring at Marineland, she did live to be nearly 50 y old (“Rare ‘Blonde’ Dolphin at Marineland Dies at Age 47,” 2009). Given that two to three dolphins in the Steinhatchee area were captured in the 1960s because of their “blonde” coloration, there is unlikely a significant selection against this coloration in this area. Unfortunately, this artificial selection for this trait by capture operations might have removed a major source of gene flow of hypopigmented dolphins into proceeding generations. The observation that MNOS, the hypopigmented adult from our sighting, was nursing a normally colored calf suggests that it is possible that the underlying recessive genetics could continue to be carried by normally colored offspring of the adult dolphins that were captured.

This is the first sighting by dedicated marine mammal researchers of a hypopigmented, suspected leucistic bottlenose dolphin in the northeastern GOM. The adult female dolphin nursing a normally colored calf makes the sighting even more unusual. The use of news articles that are over 50 years old aided in the creation of this paper and represents a potentially useful dataset of information in public records regarding rare sightings such as leucistic marine mammals in never-before-reported locations like the northeastern GOM.

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