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SHORT COMMUNICATION

First record of a piebald leucistic smallspotted catshark *Scyliorhinus canicula* in a special area of conservation, UK

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Abstract
Colour aberrations are widely reported in vertebrates, but seldom for elasmobranchs. Shark trophic level varies ontogenetically and according to species, so atypical colouration may have implications for ecological fitness both as predator and prey. Here, we present, to our knowledge, the first and only record of a piebald leucistic smallspotted catshark *Scyliorhinus canicula* from Welsh waters, specifically in the Cardigan Bay Special Area of Conservation, UK. This adds to the five previous observations from the Irish and Mediterranean Seas. Sharks face numerous threats, including the physiological impacts of climate change. In this context, the prevalence and implications of leucism remain a knowledge gap.

Keywords BRUVS · Chondrichthyes · Elasmobranch · Hypomelanosis · Northeast Atlantic · Scyliorhinidae

Introduction

Hypomelanosis is a pigmentation deficiency that includes conditions such as albinism and leucism. Although observed in a range of vertebrates (Mendes Pontes et al. 2020; Alby et al. 2023; Park et al. 2024), these conditions have been reported in fewer than 5% of chondrichthyan species (sharks, skates, rays and chimaeras; Skelton et al. 2024). Furthermore, observations tend to be sporadic and limited to individuals or a small number of specimens (Arronte et al. 2022; Jiménez et al. 2023; Shipley et al. 2023; Gajić et al. 2024). Leucism, specifically, is caused by a recessive allele and characterised by partial pigment loss but some retention of normal iris colouration (Clark 2002; Bigman et al. 2016); within this, piebald leucistic individuals show localised patches of reduced or abnormally light pigmentation amidst normal pigmentation, with normal eye colour (Ebert 1985; Acevedo et al. 2009; Abreu et al. 2013). There are only 25 known observations of piebaldism in sharks in the wild (Whitehead et al. 2025). The ramifications of colour aberrations for ecological fitness are unclear, particularly in the context of predation, predatory evasion, and reproductive success (Shipley et al. 2023), and potentially sensory functions such as hearing, where melanin may play a protective role (Coffey 2014). Furthermore, challenges associated with sampling mobile and depleted marine species (Cappo et al. 2007) are prohibitive for comprehensively determining the prevalence of these abnormalities in sharks.

Smallspotted catsharks *Scyliorhinus canicula* (L., 1758) are widely distributed in the nearshore Northeast Atlantic, with a stable population listed as Least Concern by the International Union for the Conservation of Nature (Finucci et al. 2021). It is a mesopredator (trophic level 3.8) that is centrally important to regional food webs (Wieczorek et al. 2018). Continued global shark depletion (Dulvy et al. 2014, 2021), particularly in national waters (Worm et al. 2024), may yet further elevate its trophic importance (Ritchie and Johnson 2009). Hypomelanosis is known to affect *S. canicula*, with five records of albino or leucistic specimens from the Irish Sea (Quigley et al. 2018; O'Callaghan and

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O'Callaghan 2021; Quigley 2021) and the Central Mediterranean Sea (Mnasri et al. 2010).

Materials and methods

Shark assemblages and spatiotemporal habitat use were investigated using baited remote underwater video stations (BRUVS) in the Cardigan Bay Special Area of Conservation (SAC), UK in May, July and September 2021, and March, May, July and September 2022. A total of 152 BRUVS with GoPro Hero7 Black cameras (1440 video format, 30 frames per second, linear field of view) were deployed in randomised locations. Bait was scad *Trachurus trachurus* (L., 1758) and BRUVS were deployed for a minimum of one hour (see Cook et al. 2024a for full methods). Following exclusion of unusable datasets (see Jones et al. 2021), a final sample size of 121 videos was retained for full annotation of shark sightings.

Results

Scyliorhinus canicula was sighted on 29 of 121 BRUVS (24%) set between May 2021 and September 2022; on one BRUVS deployed at 14h16 in 4 m depth (15th May 2021; 52°13′8.19 N, 4°20′8.75 W), we recorded an individual with unusual colouration that made a single pass in front of the camera. Closer examination of still images extracted from the video footage enabled several relevant colour observations; abnormal white markings were prevalent on the lower posterior half to the caudal fin amidst otherwise normally pigmented areas, and eye colour showed normal dark iris pigmentation (Fig. 1). We therefore classify this individual as a piebald leucistic specimen.

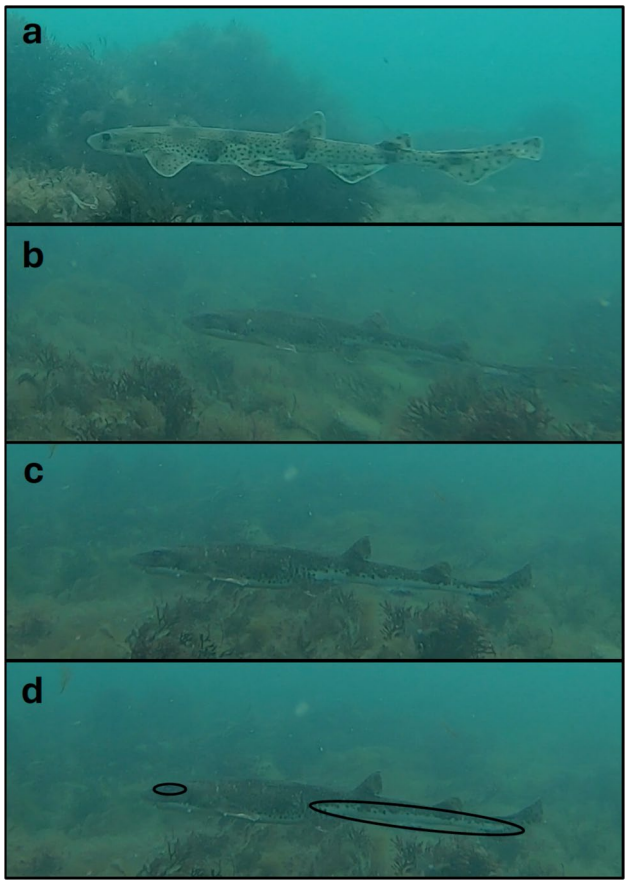

Fig. 1 Frame grabs of smallspotted catsharks *Scyliorhinus canicula* (L., 1758) observed on baited remote underwater video stations in Cardigan Bay Special Area of Conservation, UK. **a** Individual with normal colouration; **b–d** single observation sequence of piebald leucistic individual; panel d annotated to highlight normally pigmented iris and abnormally pigmented lower posterior flank to caudal fin. See Cook et al. (2024b) for full video clip

Discussion

Adding to known records, we report, to the best of our knowledge, only the sixth observation of leucism in *S. canicula*, and the first from either Cardigan Bay SAC or wider Welsh waters. Despite water visibility that precluded perfectly clear footage, we confidently identify key features that further indicate piebaldism in the observed specimen. This not only adds to a mere 25 records of this phenomenon in wild sharks, but also suggests that the occurrence may extend further than has currently been established. The widespread and common nature of *S. canicula*, together with it being commonly caught by recreational anglers, suggests that citizen science programmes or online image repositories could yield observational data to further elucidate species hypomelanosis prevalence. For example, as of 16th October 2025, iNaturalist (inaturalist.org) hosts 3,893 observations identified as *S. canicula* (albeit including egg cases, which would be largely irrelevant in this context), submitted by 1,617 observers. This therefore warrants further research attention, as demonstrated by a growing body of work using citizen science records to address ecological knowledge gaps in fish (e.g. Gartside et al. 1999; Fetterplace et al. 2018; Näslund and Lundgren 2018; Cameron et al. 2019).

A knowledge gap persists, however, regarding the ecological implications of hypomelanosis in sharks. Here, the time of first arrival, swimming behaviour and body condition were comparable to other *S. canicula* sighted during the study. It is impossible to compare time of first arrival beyond this study since we are unaware of another in situ BRUVS sighting of a leucistic shark. Normal swimming behaviour has, however, been recorded in a nurse shark *Ginglymostoma cirratum* (Bonnaterre, 1788) with skin aberrations (Shipley et al. 2023), while the capture of a mature individual with

xanthism (another pigmentation abnormality) suggests no impact on survival (Macías-Cuyare et al. 2025). Similarly, normal body condition with no signs of disease or damage has been recorded in mature albino (Quigley 2021) and leucistic *S. canicula* (see Quigley et al. 2018), with the anatomical distribution of the piebald patches in the latter similar to the specimen presented in this study. This aligns with a lack of any associated abnormal morphology in other piebald wild sharks (Whitehead et al. 2025).

Given the ongoing vulnerability of shark populations, future research should not only seek to address the evidence paucity regarding hypomelanosis prevalence and ecological implications, but also investigate the relevance of potential ecotoxicological drivers of skin pigmentation disorders in fish (Nur et al. 2019). Together, these knowledge gaps should be considered in the context of other aspects of physiological functioning, such as those under projected climate change scenarios (Musa et al. 2020; Pegado et al. 2020; Ripley et al. 2021; Varela et al. 2023; Coulon et al. 2024a, 2024b).

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Declarations

Ethical approval The results presented here arise from field observations and therefore no ethical approval was required.

Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing interest The authors declare no competing interests.

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