

Not Always Black and White: Colour Aberrations in the Dovekie

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ABSTRACT. We describe four records of colour aberrations in the dovekie (*Alle alle*). During six years of studies of breeding ecology in two large dovekie colonies in West Spitsbergen, we recorded one albino chick (white feathers, red eyes, pinkish legs and feet), one adult or subadult with a “brown” aberration (all black parts turned dark brown), one adult in a typical summer plumage with depigmented (pinkish) legs and feet, and one chick in a typical plumage, but with whitish feathers on back and wing coverts. Albinism and “brown” mutations are heritable traits. The two remaining colour aberrations probably have been acquired and might have been caused by disease, malnutrition, or other unknown factors.

Key words: dovekie, colour aberrations, albinism, “brown” mutation, leg depigmentation

RÉSUMÉ. Nous décrivons quatre mentions d’aberrations de couleur chez le mergule nain (*Alle alle*). Au cours de six années d’étude en écologie des oiseaux nicheurs au sein de deux grandes colonies de mergules nains de Spitzberg Ouest, nous avons dénoté un oisillon albinos (ailes blanches, yeux rouges, pattes et pieds rosés), un adulte ou jeune adulte doté d’une aberration « brune » (toutes les parties noires étaient devenues brunes), un adulte au plumage d’été typique et avec pattes et pieds dépigmentés (rosés) et un oisillon avec plumage typique, mais doté de plumes blanchâtres sur le dos et la couverture alaire. L’albinisme et les mutations « brunes » sont des caractères héréditaires, tandis que les deux autres aberrations de couleur ont probablement été acquises et peuvent être le résultat de maladie, de malnutrition ou d’autres facteurs inconnus.

Mots clés : mergule nain, aberrations de couleur, albinisme, mutation « brune », dépigmentation des pattes

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INTRODUCTION

Several types of colour aberrations of plumage or bare parts of the body have been described in wild living birds. Albinism, leucism, “brown,” and “diluted” mutations are the most frequently reported (Buckley, 1982; van Grouw, 2006). Albinism is defined as a total lack of both melanins (eumelanin and pheomelanin) in feathers, eyes, and skin as a result of an inherited absence of tyrosinase. Leucism is a partial or total lack of eumelanin and pheomelanin in the feathers as a result of an inherited disorder of the deposition of these pigments in the feathers. Leucistic birds always have coloured eyes. In the “brown” aberration, an inherited incomplete oxidation of eumelanin causes black feathers to turn dark brown. In the case of dilution, the pigment itself is not changed, but a reduction in pigment concentration, or “diluted” colour (called “pastel” if both melanins are affected or “isabelism” if only eumelanin is affected) is observed compared to the original colouration (van Grouw, 2006).

Albinism, leucism, and isabelism are the most commonly reported colour aberrations in seabirds (e.g., Gross, 1965; Sealy, 1969; Forrest and Naveen, 2000; Voisin et al., 2002; Everitt and Miskelly, 2003; Oosthuizen and de Bruyn, 2009; Mancini et al., 2010). However, most of the aberrations in these references are wrongly named, and the

majority of them represent “brown” mutation, which is the most common colour aberration in seabirds (van Grouw, pers. comm. 2011). Plumage showing this mutation is very sensitive to light, and therefore birds with this aberration can become much paler as their plumage ages. In seabirds, this bleaching out is even quicker and stronger because of the combination of water, sun, and no shade. The bleaching often makes it hard to distinguish the different mutations, which is why there is still a lack of clarity in the ornithological world about the correct naming of them. As a result, without a clear photograph, records of aberrant colouration in certain species are often unreliable because of the incorrect identification or naming of the causative mutation (van Grouw, 2010).

The frequency of occurrence of such aberrations is extremely low. For instance, only one leucistic penguin per 20 000 to 146 000 individuals (depending on the species) was reported from the Antarctic Peninsula (Forrest and Naveen, 2000). Rarity of plumage colour aberrations in wild living birds is expected to be associated with decreased life expectancy resulting from increased rates of predation and intraspecific conflict (Holt et al., 1995).

In this study, we describe four records of colour aberrations in the most abundant alcid in the Palaearctic (Stempniewicz, 2001)—the dovekie (*Alle alle*).

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FIG. 1. Dovekie chicks from the breeding colony in Magdalenefjorden. An albino chick (left) and a typically plumaged chick (right) are shown at the age of 3–6 days (above) and 13–17 days (below).

DESCRIPTION OF OBSERVATIONS

We observed the colour aberrations in dovekies during our study of their breeding ecology in two large colonies on the west coast of Spitsbergen, in Magdalenefjorden (Høystakken and Alkekongen slopes, 79°35' N, 11°05' E) and Hornsund (Ariekammen slopes, 77°00' N, 15°33' E). Those two sites are considered the main breeding areas of the dovekie on Svalbard (Isaksen, 1995). We conducted the study in six seasons, in 2006 and 2011 in Hornsund and in 2007–10 in Magdalenefjorden. For the purpose of that study, we observed and counted individuals in the colony area, captured the adults (in total 1783) and weighed the chicks (467), and recorded our observations.

We found an albino chick in one of the controlled nests at Høystakken slope in Magdalenefjorden in 2010. The skin, feathers, and bill lacked pigmentation, and the eyes were red. The legs and feet were pinkish, with no pigmentation. At the early stage of growth (3–6 days old), the down was buff. At the age of 13–17 days, when juvenile plumage had fully developed, all feathers were white (Fig. 1). Later, the chick became inaccessible (probably escaped deeper in the talus, out of range of the researcher). Thus, we do not know whether it fledged successfully. One parent of the chick had typically coloured plumage, but we did not capture or observe the second parent.

We observed an adult or subadult individual with dark brown upperparts (back, wing coverts, upper part of head and neck) and whitish remiges (flight feathers) (Fig. 2) in the colony in Hornsund in 2011. We observed that individual four times from a distance of 50–200 m. In dovekies, as in auks, the black colour is completely caused by eumelanin (van Grouw, 2006), and thus the observed individual



FIG. 2. Adult or subadult dovekie with “brown” colour aberration observed in the breeding colony in Hornsund. In the background are typically plumaged adults.

represents the “brown” aberration, in which the appearance of the eumelanin in feathers is changed. Such feathers, especially old ones, are very sensitive to sunlight and bleach quickly and strongly, often turning almost white (van Grouw, 2006). We observed the described individual two times during 48 hours of non-stop watch, and each time its gular pouch (sac structure located below the bill to transport food for chicks) was empty. All active breeders observed at the same times were recorded at least six times during the observation with a gular pouch filled with food for the chick. Moreover, we observed the “brown” dovekie each time in different parts of the colony. All these facts suggest that the observed individual was a non-breeding adult or subadult. Age identification was impossible, since the colour of primaries, secondaries, and wing coverts is the main feature (Stempniewicz, 2001).

We observed a breeding adult with typical summer plumage but depigmented legs and feet (pinkish with only small black spots) (Fig. 3) in the colony in Magdalenefjorden in 2011. We caught the bird in the nest twice during incubation. The same individual had been caught and ringed in the previous season, but at that time it had typically pigmented legs and feet (uniformly black).

We observed a chick plumaged differently from the two distinct variants described by Stempniewicz (1989) in Hornsund in 2011. When observed, the chick was 13–17 days old, thus it has almost fully developed “summer” type juvenile plumage (resembling the breeding plumage of adults; Stempniewicz, 1989). The unique features were partly white feathers on the back and whitish wing coverts and neck (Fig. 4). The parents of the chick were unknown.

DISCUSSION

Prior to our study, three records of colour-aberrated dovekies were reported by Sealy (1969). However, those individuals were not described in detail, and considering the general confusion in naming of colour-aberrated



FIG. 3. Depigmented legs and feet of an adult breeding dovekie caught in Magdalenefjorden.

individuals (see van Grouw, 2006, 2010), it is now impossible to classify the type of colour defects they represented.

In dovekie chicks, albinism or other plumage colour aberrations probably decrease life expectancy as a result of increased rates of predation by the glaucous gull (*Larus hyperboreus*). Chicks are especially vulnerable to gull predation while exercising their wings intensively outside the nest chamber during the two weeks before colony departure (Stempniewicz, 1995, 2001). Chicks with albino and whitish plumage are likely to be more visible to gulls patrolling the colony than individuals with typical plumage. Moreover, juvenile plumage different from the typical one (which resembles summer adult plumage) may reduce the antipredatory mimetic effect (members of a fledging-parent pair departing the colony seem almost identical in flight, making it difficult for predators to identify the more vulnerable juvenile) and decrease the chances of survival during fledging (Stempniewicz, 2001). Albinos are very light-sensitive and have difficulties in observing depth, and most of them are hunted by predators soon after the start of their independence, at fledging (van Grouw, 2006). Possibly this is the reason why among colour-aberrated auks reported by Sealy (1969), albinos were represented only by chicks.

Individuals with colour aberrations are expected to attract increased intraspecific aggression (e.g., Holt et al., 1995); however, we did not observe such behavior toward the “brown” adult or subadult dovekie reported above. Similarly, colour-aberrated penguins did not experience increased aggression from conspecifics (Everitt and Miskelly, 2003). In penguins and other alcids, adult individuals with leucism or other colour aberrations were reported as regular breeders (Sealy, 1969; Voisin et al., 2002; Everitt and Miskelly, 2003). These reports confirm that such forms, in contrast to albinos with decreased life expectancy, have a chance for successful nesting.

Albinism and the “brown” mutation have a genetic cause. The albino mutation is inherited through an autosomal recessive gene. The inheritance of the “brown” mutation is recessively sex-linked. A brown mutant with two normally coloured parents is always a female (van Grouw, 2006, 2010). Frequency of occurrence of inherited colour aberrations such as albinism or leucism in a population may



FIG. 4. Dovekie chicks (age: 13–17 days) from the breeding colony in Hornsund. Above: Atypical plumage. Below: Typical (“summer” type) juvenile plumage.

periodically be higher as a result of inbreeding (e.g., during the establishment phase) or an increased mutation rate (e.g., after nuclear contamination) (Ellegren et al., 1997; Bensch et al., 2000). Thus, monitoring of inheritable colour aberrations in long-term or geographically large-scale studies gives a chance to identify populations that have been exposed either to inbreeding or to environmental stress (Bensch et al., 2000).

In the two remaining instances of colour-aberrated dovekies, the aberrations probably are not hereditary and could have been acquired. The depigmentation of legs and feet recorded in the adult might have been caused by malnutrition, disease (e.g., loss of pigment due to the destruction of pigment cells by the immune system described in some mutant chickens; Smyth, 1989), or other unknown factors. As partly coloured feathers are very unusual in leucism, such a pattern recorded in the dovekie chick described in this study rather indicates a bad condition of the bird during feather growth (van Grouw, 2006). More frequent occurrence of such acquired aberrations may be indicative of poorer food conditions, parental budget constraints, or both.

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