
BIRDS

ARE EARED GREBES WITH A CHESTNUT RED FORENECK ABSENT FROM NORTH AMERICAN POPULATION?

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Abstract

Examples of Eared Grebes (*Podiceps nigricollis californicus*) in breeding plumage with chestnut red feathers in their upper breast and foreneck seem to be absent from the North American ornithological literature, while seven records exist in European Black-necked Grebes (*P. n. nigricollis*). A photo search identified seven Eared Grebes, three of them in Canada, affected by the mutation that may simply have been overlooked until now, so the character trait could be widespread in the *californicus* subspecies.

Introduction

During a study on colour mutations affecting the plumage of grebes (Podicipedidae), I noticed that one aberration typical for *P. nigricollis* was considered very rare in European Black-necked Grebes (*Podiceps nigricollis nigricollis*) while it appeared to be completely absent in North American Eared Grebe populations (*P. n. californicus*). The mutation

produces a chestnut red coloration in the upper breast and foreneck of the breeding plumage in Black-necked Grebes. At some distance, they resemble Horned Grebes (*P. auritus*). In Europe, a total of seven individuals displaying the condition were recorded. The first was collected in 1883 at Lake Velence in Hungary.¹ The next observation was much later, in 1969.² It was followed by a record in 1974,³ two records in 1994,⁴ a record in 2005 (García Rios, unpublished) and a last record in 2009 (Konter, in press). Except for the first observation and García Rios' sighting from Spain, all other observations were from Germany. In contrast, the North American ornithological literature seems to be silent; not a single record of an Eared Grebe with a chestnut red foreneck could be found. The question arose: whether individuals affected by the genetic mutation had passed unnoticed, or whether they were really absent from North American populations. To check this, I went through over two thousand of my own photos of



Figure 1: Comparison; typical Eared Grebe (near) and chestnut red foreneck (far) (see back inside cover for colour image) © 2012 Heather Cuthill

Eared Grebes and I also surveyed photos published on the internet.

A short introduction to genetic mutations affecting the pigmentation of birds

The coloration of the plumage and bare parts of birds results from color pigments. Overall, there are many different color pigments. Most common in birds are melanins followed by carotenoids. Grebes rely almost entirely on melanins for their coloration. There are two different forms of melanin. Depending on concentration and distribution within the feather, eumelanin is responsible for black, grey

and dark brown whereas pheomelanin is responsible for warm reddish-brown to pale buff colors. Both melanins together can give a wide range of grayish-brown colors.⁵

If melanin deposition in feathers is altered, aberrant individuals result. Old age or sickness may cause this, while other aberrations are caused by genetic mutations. In the latter, we generally recognize six different results. Three of them (leucism, dilution and melanism) can be caused by several different mutations, while the other three (albinism, brown and ino) are all caused by a single genetic mutation.⁵

The following explanations are largely based on van Grouw.^{5, 6, 7} Albinism is caused by a complete absence of both melanins in feathers, eyes and skin. Generally, all-white plumage, red eyes, pink feet and a pink bill result. Leucism is caused by a total lack of both melanins in some or all feathers. It may affect bare parts, but does not affect the eyes. If all feathers are white, leucism is total, otherwise it is partial. Brown expresses by a qualitative reduction of eumelanin only. Due to an incomplete oxidation, what is ordinarily black or grey becomes brown and bleaches further. A quantitative reduction of one or both melanins is called dilution. Dilution may take several forms, depending on whether one or both melanins are affected. Most common are a quantitative reduction of eumelanin only (isabel dilution) or of both melanins (pastel dilution). The degree of dilution is variable. Affected colors will look faded and may bleach further. A qualitative reduction of both melanins without that the quantities produced are changed is called ino. What is ordinarily black becomes very pale brown to cream; what is ordinarily reddish-to yellow-brown remains hardly visible. The iris turns pinkish, the feet and bill pink. Finally melanism is an abnormal deposit of pigments that may express

in three different ways: by an altered distribution, by the deposit of higher quantities including in parts previously uncolored and by a change in the form of melanin produced.

The mutation of interest here is the third type of melanism. It was first described by Harrison⁸ who noted that where the chestnut-red melanin appeared, it seemed to replace the other melanin pigments. He⁹ proposed to refer to it as erythromelanin. Campbell and Lack¹⁰ considered the abnormal change to chestnut-red occurring in individuals of some species, to be a mutation resulting in a qualitative reduction of eumelanin. Today it is clear that there is no third type of melanin. However, we still lack a detailed explanation on how the change from, in the case of Eared Grebes, black to chestnut red plumage occurs. For the time being, we may continue to call the result erythromelanism.

Material and methods

To check the occurrence of red-necked Eared Grebes in North American populations, I revisited all own photos of the species taken during visits to Manitoba and Saskatchewan (July 2006, May 2008), Alberta (July 2012), California and Oregon (July 2009, May 2011) and Utah (July 2010). In addition, I searched

the internet for photos of Eared Grebes on <http://www.flickr.com/> using the search string “Eared Grebe photos”.

Results

Three of my own photos showed Eared Grebes in breeding plumages with chestnut red in their foreneck and upper breast. At Oak Hammock Marsh, Manitoba, an individual displayed a bright chestnut upper breast in July 2006. In its lower foreneck, chestnut tinges existed while the upper neck was entirely black. At Farmington Bay, Great Salt Lake, Utah, I photographed on 1 July 2010 an Eared Grebe which had the foreneck and upper breast interspersed with many chestnut feathers. Out of some distance, this area looked rather red. A grebe in complete breeding plumage with an intense chestnut upper breast and foreneck interspersed with some black feathers was present at Lower Klamath Lake, California, in May 2011.

On flickr.com, an additional four examples were retrieved. R. Michal photographed an Eared Grebe in breeding plumage with a chestnut red upper breast and foreneck at Henderson Bird Viewing Preserve, Las Vegas, Nevada, on 5 July 2009. At Ventura Marina, California, M. Forsman took a picture of a grebe with chestnut red tinges

on the foreneck on 16 July 2011. This individual engaged in a body shake and was of particular interest in that it displayed a completely brownish red belly. While the chestnut tinges on the upper breast and lower neck were not very pronounced, the unusual pigmentation of the belly was striking. At Klein Park, Calgary, Alberta, a female in complete breeding plumage showed a chestnut red upper breast and lower half of the front neck on 1 June 2012 (Figure 1). D. Delaney photographed a grebe in breeding plumage with chestnut red lower foreneck and upper breast (Figure 2; see inside back cover) at John E. Poole Wetland, St. Albert, Alberta on 20 May 2013.

Finally, on the internet page www.apogeephoto.com, A. Long showed a photograph of a nesting Eared Grebe with chestnut red upper breast and foreneck. Place and date of his picture were not indicated, but it was probably taken around 2001 in Colorado.

I may add that at least two of the erythromelanistic individuals bred successfully as they were caring for chicks, one was nesting and two others appeared to be paired to normal Eared Grebes.

Discussion

Similar to Europe, a total of eight Eared Grebes having chestnut red feathers in their upper breast

and foreneck were found in North America, in a much shorter time frame. Three of them were recorded in the Canadian prairie states. This suggests that the mutation may be widespread and is simply overlooked in Canada and in the USA.

Affected Eared Grebes resemble the now extinct Colombian Grebe *Podiceps andinus*. The latter is by some considered a species of its own, by others a subspecies of *P. nigricollis*. It is conceivable that in ancient times a small population of Eared Grebes in which the gene for chestnut melanism was widespread became isolated in the Bogota highlands. Considering that melanism is generally a Mendelian dominant,¹¹ erythromelanistic grebes had a good chance to completely invade this subpopulation rather rapidly. Even with recessive alleles, this could have been achieved. In general, low population sizes strongly contribute to loss of genetic variation. On average, this increases the level of homozygosity.¹² Through sexual selection, the genes for the expression of the trait and the genes for mating preferences for the trait may then become genetically correlated.¹³ Assortative mating may thus have produced a subpopulation of Eared Grebes with a different appearance from

the parental stock. In this case, DNA investigations should reveal genetic differences to *Podiceps nigricollis californicus* that would only warrant subspecies status. To what extent the mutation causing erythromelanism in Eared Grebes may be dominant or recessive cannot be directly investigated in the field. There, we may only find out to what extent the expression of the trait is widespread. Its occurrence may occasionally challenge the identification skills of birdwatchers as at some distance confusion with Horned Grebes becomes possible. The very limited number of observations suggests that erythromelanistic Eared Grebes present a curiosity that contributes to genetic variability in the species rather than anything else. The trait as such does not seem to provide any disadvantages with respect to health or fitness to the individuals concerned. The pairing and breeding success of the individuals retrieved a priori supports this statement. The occurrence of these aberrant individuals and their chances for successful pair bonding and breeding should be further investigated in the field.

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