The REDHEAD

Red-headed Woodpecker Recovery

Summer 2010 A Special Committee of the Audubon Chapter of Minneapolis Vol. 4 No. 3

Note From the Editor

The feature subject this month "Are RHWO's sexually dimorphic under uv light?" has not led to an definitive answer! A search of the literature has many articles about the subject (see article inside), but none specifically mentioned the red-headed woodpecker. The good news is a local ornithologist, Dr. Scott Lanyon of the Bell Museum at the University of Minnesota, has coauthored a major paper about the subject. You can view the paper at <www.ncbi.nlm.nih.gov/pmc/articles/PMC1691429/pdf/12965000.pdf>. His co-author on the paper, Dr. Muir Eaton published a subsequent paper entitled *"Human vision fails to distinguish widespread sexual dichromatism among sexually "monochromatic" birds",* (Proc Natl Acad Sci USA. 2005 Aug 2;102 (31):10942-6).

Unfortunately neither paper specifically mentions RHWO's. Consequently, I have written a review about bird colors

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A Note from the Chair

Well, our spring surveys are complete and with the help of 20 volunteers and our new intern at Cedar Creek, Ari Waldstein, we were able to locate 22 nesting pairs of red-headed woodpeckers. Most were in the traditional area along Durant Road north toward Fish Lake. Ari, has been such a huge addition to our program and our thanks to Professor Todd Arnold from the University of Minnesota for helping to secure a grant to fund Ami's work at Cedar Creek which will be part of her Master's project. Because of Ari's daily presence, this is the first year we have an idea of how many juvenile RHWO are fledging. This year's conservative estimate is 30 but it's tough to count woodpeckers with so many in such a small area.

Mary Miller reports that finding clusters of RHWO in the Southwest section of our state was not very encouraging. Numbers of single birds are present, but the area is too intensely farmed and habitat is next to non-existent. But there is one very bright light in cluster work shining at Fort Ripley army base just south of Brainerd. Professor Bill Faber from Central Lakes Community College has some interns working there on bird surveys and they report as many as 20 birds on the Fort's property. One of our teams of surveyors is visiting and will report back on what they find, but things look very positive at this point.

By now most RHWO nests are empty with juveniles hanging around still relying on mom and dad for food. We still need to check out a number of golf courses in the Mille Lacs area and can always use your input if you know of groups of RHWO any place in the state.

Chet Meyers, Chair

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seen and unseen. I hope you find it informative.

Again a reminder that I am always looking for articles about RHWO's and their habitat. Good pictures are also welcome. Also send ideas about feature topics for upcoming issues. Send them to me at rhwracm@comcast.net. Remember we meet the third Wednesday of the month at the Lunds Store at 50th & France at 7:00 pm. Volunteer to help us with our survey of RHWO's at Cedar Creek, golf courses and around the state and region.

Jerry Bahls, Editor

Membership Dues

The Red-headed Woodpecker Recovery (RhWR) receives almost all of its revenue from its membership dues. The RhWR dues are $10/yr. New members will receive a packet, which will include the new RhWR button and sew-on patch as well as the latest *"The REDHEAD"*. Because we have decided to establish our membership year as July 1 - June 30 (all memberships will expire on June 30 of the year the membership was established). Renewals will remain at $5/year, but will expire on June 30 of the period of renewal. Look for future announcements regarding lifetime memberships and renewal dues.

New memberships and renewals can be made by sending your name, address and e-mail address or fill in the membership application form on the last page of this newsletter to the address below. Please make check payable to Audubon Chapter of Minneapolis RhWR.

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Thank you for your continued support.

What Causes Bird's Colors

Why are the red-headed woodpeckers red, white and black? A bird's colors are caused in two different ways by pigments or by light refraction as a result of the feathers structure[1]. Sometimes the color is a combination of both. For example light refraction often causes the feathers to appear to be blue, but when in combination with a yellow pigment the result may appear to be green.

Pigments are the result of three classes of chemicals - melanins, carotenoids and porphyrines[1].

Melanins exist as tiny granules in a bird's feathers or skin to give blacks, browns and pale yellows[1]. These granules act like carbon black in rubber, they increase the strength of feathers. That is why wings are often black, especially their tips.

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Carotenoids cause the reds and bright yellows in birds. These colors are caused by the birds diet. Carotenoids are produced by plants and are eaten by birds or birds eat what ate the plant[1].

Porphyrines are complex molecules that contain a metal at the center surrounded by a protein that circles the metal. They produce reds, pinks, browns and greens[1].

So why are there white feathers? It's the absence of pigment and structural features that scatter light.

Therefore the black in a red-headed woodpecker is probably caused by melanins. The whites are likely the lack of a pigment. The red head could be from carotenoids, but their diet doesn't seem to be adequate to generate the intense red. Thus the red is probably from porphyrines.

As the adjoining article's subject[2,3] suggests most birds including the red-headed woodpecker see in the ultraviolet (uv) range of the light spectrum. This gives the birds an advantage in the search for food as well as in the competition for a mate[4].

So is the red-headed woodpecker sexual dimorphic to other birds or to other red-headed woodpeckers who see in the uv range? An analysis of the colors on the RHWO show the following. Black has very little uv reflectance[3] and thus would appear as a black hole to one with uv receptors. White reflects almost all the uv light[3] and thus would appear as a bright spot to the observer. Both of these colors probably would not give any clues to the observer as to its sex, unless there are subtle areas that are not obvious in the visible light range. The red, if it is based on porphyrines, could reflect differently in uv light[1] and thus could show sexual dimorphism. In corresponding with Dr. Scott Lanyon of the Bell Museum Ornithology Department asking if they had studied the RHWO in their studies on uv reflectance of bird feathers stated they had not looked at them. But did offer to have a student look at them this Fall. We did ask him to do so if possible. We look forward to his results and hope to publish it when they become available.

1. http://www.birds.cornell.edu/AllAboutBirds/studying/feathers/color/document_view
2. Jennifer Amie, Imprint, 2005 (http://www.bellmuseum.org/imprint/birdseye03.html)
3. Eaton, M. D. & Lanyon, S. M. 2003. The ubiquity of avian ultraviolet plumage reflectance. *Proc. R. Soc. Lond. B* 270: 1721-1726.
4. Martin Stevens and Innes C. Cuthill, *June 2007,* Hidden Messages: Are Ultraviolet Signals a Special Channel in Avian Communication? BioScience: *Vol. 57 No. 6, 501 - 7.*

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Factoid: Humans have 3 sets of visual cones enabling us to see light at wavelengths between 400 to 700 nanometers. Many birds have a fourth set of cone cells that perceives the UV range, from 320 to 400 nanometers.

"Reprinted with permission from Imprint (2005), the member newsletter of the Bell Museum of Natural History"

A Bird's Eye View: Ultraviolet Vision Lets Birds See What Humans Can't

by Jennifer Amie

From the hummingbird's ruby throat to the oriole's black head, we rely on appearances to identify bird species and distinguish males from females. In fact, our observations of plumage patterns and color have for more than a century formed the basis of many theories of bird evolution and behavior. As it turns out, we've been looking through a flawed lens.

When human beings look at a pair of Parus caeruleus (European blue tits—see cover photo), we see a male and female that look alike, each with an identical blue patch on top of its head. To another bird, however, the male in this pair is quite distinct from his mate. His "blue" patch is another color entirely—an ultraviolet-enhanced blue that is not visible to the human eye. His feathers reflect light in the ultraviolet range, at a frequency just outside the spectrum of colors the human eye can detect.

In the mid-1980s, scientists first discovered that birds can see what humans can't. To humans, the rainbow of visible colors spans the range from wavelengths of 400 nanometers (violet) to 700 nanometers (red). In between are the familiar purples, blues, greens, yellows, and oranges.

Birds, on the other hand, also perceive colors below the 400 nm wavelength, in the ultraviolet range between 340 nm and 400 nm. This slight extension of the spectrum of visible color results in a markedly different perception of the world. "For every color that a human sees, a bird sees many, many more," says Bell Museum director and ornithologist Scott Lanyon.

The recent discovery that birds have access to a broader range of sensory information points out the limitations of our own powers of perception.

Imagine that you are a birdwatcher walking through the woods and trying to count birds—but you're wearing a Walkman turned up to high volume. How many birds will you find? Now imagine that your headphones have been removed. How many birds will you find? Additional sensory information, such as the ability to hear bird calls, would dramatically change your perception of the environment.

Likewise, says Lanyon, birds' perception of the world is dramatically affected by their ability to see in the ultraviolet range.

"In the two centuries since Linnaeus got us started classifying birds, we've been colorblind," says Lanyon. "We've looked at these species through one pair of glasses, and our prescription was all wrong."

Birds' remarkable range of vision may affect all behaviors and adaptations related to sight, causing scientists to re-evaluate longstanding theories on how birds find food, avoid predators, migrate, choose mates, and find nesting places. Of particular interest is the long-held theory of sexual selection, first proposed by Charles Darwin to explain why, in some species, males are more brightly colored than females. Such species are called dichromatic.

In most dichromatic species, females are choosy about their partners. Scientists believe that they prefer males with bright colors or extravagant feathers.

Scientists have generated many hypotheses to explain this process of sexual selection:

- The effect of parasites is more visible in brightly colored feathers, enabling females to evaluate at a glance the health of a potential mate.
- Males' bright plumage signals other males to keep away, helping to defend territorial boundaries.
- Bright colors make male birds more visible, and therefore more vulnerable. Males that survive despite this "handicap" have demonstrated their strength and worth as mates.

Underlying all these theories has been the assumption that birds see the world the way we do.

"Suddenly, we realize that birds look really different to each other," says Lanyon. This discovery calls into question all of our existing ideas about dichromatic species. Scientists now think it is possible that UV coloration is an important component in plumage displays of dichromatic birds. Another, even more intriguing, possibility is that many more birds are dichromatic than previously thought. In many species of birds, males and females are monochromatic—that is, they look alike to the human eye. What if such birds, in fact, have UV color differences that humans cannot see?

Bell Museum graduate student Muir Eaton is working with Lanyon to answer these new and pivotal questions and, more fundamentally, to figure out how UV coloration evolved. Previously, scientists had not known whether UV coloration was limited to the small number of species in which it was initially discovered. Using a device called a spectrometer, Eaton and Lanyon measured UV reflection in 312 species of birds representing all the major bird families. They discovered that virtually every bird has some UV-colored plumage.

What does this mean for existing theories about birds? Eaton is addressing this question by correlating his data about UV reflection in various bird species with information about their habitats, flock size, nesting habits, and locations.
"I want to see if UV coloration has evolved differently in different habitats," says Eaton. If a bird lives on the forest floor, for example, the sunlight reaching the bird is filtered through a canopy of trees, creating a distinct visual environment. Quite different light conditions exist in open country. Eaton hopes to discover whether such habitat differences affected the evolution of UV coloration in birds' plumage.

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Social structures may also be a factor in the development of UV coloration. For example, UV plumage may be important to flocking birds, who use visual signaling as a critical means of communication.

Last but not least, Eaton is attempting to discover whether birds that appear to humans to be monochromatic are dichromatic to each other. He has selected 240 species of birds in which males and females appear to humans to have the same coloration. Using spectrometer readings, he will discover whether some of these birds have color differences invisible to the human eye.

New discoveries about birds' visual capabilities are, in one sense, a cautionary tale, reminding scientists that the human perspective is but one among many. Though we take our own point of view for granted, it may not always reveal the many complexities of the natural world.

Factoid: Greater than 90% of bird species are actually sexually dichromatic from an avian visual perspective.

Fall Issue Feature Topic

The Fall issue's topic will be "Where do Minnesota red-headed woodpeckers go in the Winter?" Send your observations and references to scientific papers to Jerry Bahls (rhwracm@comcast.net) by October 15th. Please send observations only - no opinions! Also send any future topics to be featured in the newsletter.

Next RhWR Meetings

The RhWR usually meets on the 3rd Wednesday each month at 7:00 pm at the Lund's Store 1 block west of 50th & France in Edina. The next meetings will be on Aug. 18, Sep. 15 and Oct. 20. All are welcome and encouraged to attend. Please encourage your friends and neighbors to attend also. Check our website (www.RedheadRecovery.org) for current information.

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