

## NESTING FEMALE HOUSE FINCH SPONTANEOUSLY DEVELOPS MYCOPLASMAL CONJUNCTIVITIS

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Of the myriad wildlife diseases known, one that is particularly well-studied is the House Finch (*Carpodacus mexicanus*) – *Mycoplasma gallisepticum* (MG) host-pathogen system in North America (e.g., Luttrell et al. 1996, Stallknecht et al. 1998, Luttrell et al. 2001, Dhondt et al. 2005). This disease is thought to have originated in poultry, and since it was first discovered in House Finches in 1994 (Fischer et al. 1997), it has caused considerable mortality in many finch populations (Hochachka and Dhondt 2000, Faustino et al. 2004). The disease is also well-studied with respect to its effects on host behavior (Hotchkiss et al. 2005, Hawley et al. 2007), stress response (Lindström et al. 2005), white blood cell distributions (Davis et al. 2004), plumage brightness (Hill et al. 2004), and the relative susceptibility of different age and sex groups within populations (Altizer et al. 2004a). One of the reasons this disease is so well-studied is, no doubt, the easily-recognizable clinical signs of infection. House Finches infected with this bacteria typically develop swelling and discharge of the conjunctival tissue, which can be used as a proxy for direct testing for pathogen presence (Altizer et al. 2004a, Davis et al. 2004, Davis 2005, 2008). Indeed, much of what is known about this disease comes from reports of affected birds by citizen-scientists, that when compiled, allow disease researchers to elucidate large-scale trends (Altizer et al. 2004b). Combined, a considerable body of literature has been built around many aspects of this disease, although one area where knowledge is limited is its effects on reproduction.

Two studies have surveyed House Finch nests to elucidate the prevalence and/or effects of infection, and in both cases no observable effects were found. In one, Hartup and Kollias (1999) examined over 100 nestlings in New York and identified MG in 2 broods by polymerase chain reaction (PCR), though they saw no observable mortality associated with the bacteria. In the other, Nolan et al. (2004) surveyed a House Finch population in Alabama, examining adults and nestlings. Of 57 adults known to be breeding, there were no cases of birds with clinical signs, but the authors did detect the bacteria by PCR in 6 of these birds. They concluded that there was little evidence that MG impacted

the reproductive output of breeding birds, though importantly, their results did demonstrate that among breeding House Finches, a small proportion can be asymptomatic. The observations summarized in the current report bear on this issue.

In April 2008 at my house in Northeast Georgia, a pair of House Finches built a nest on a wooden platform that had been mounted under the roof of the home's back porch. There was nothing unusual about this nest, since House Finches are seen year-round coming to the backyard feeders at this property, and in prior years House Finches had been observed nesting in other areas of this porch (such as in hanging ferns on the porch). I witnessed the nest construction, then saw that the female began sitting for long periods on the nest, presumably egg-laying. On 9 April, the female happened to fly off the nest and into the house, where it was hand-captured and banded with a USGS leg band for later identification. During this process she was visibly inspected for signs of injury and overall condition. I noted that she was just beginning to develop a brood patch, and there was no visible evidence of current or prior conjunctivitis in her eyes, based on my experience studying the disease and captures of 1000+ House Finches (Davis et al. 2004, Davis 2005, 2008). The female was released and she was observed the next day sitting on the nest. She was subsequently observed sitting on the nest most days thereafter up to 15 April.

On 17 April at 1200 hrs, I observed this female on the ground below the nest, and she appeared to be in distress; she was weakly flapping but not taking flight. The bird was lethargic, and therefore was hand-captured. Closer inspection revealed that the female had severe clinical signs of mycoplasmal conjunctivitis in both eyes, with visible discharge and crusting (Fig. 1). The female also had a full brood patch. She was photographed and released near the nest. She initially flew away, but appeared not capable of sustained flight, flying only 20 m at a time, and then landing in the grass. The nest was watched thereafter for the rest of the day, but the female did not return. However, a lone male did appear at the nest (perching on the rim) several times that afternoon, and sang next to the nest. The nest was inspected that night, and it contained 5 eggs. The female was not seen again the next day, and that night one egg was removed from the nest and opened. A chick (dead) was inside, and appeared to be approximately 2-3 days from hatching (Fig. 2).

This observation, plus several other pieces of evidence, suggest that the female House Finch in this case suffered a spontaneous relapse of a latent MG infection. To begin with, the serendipitous capture of her at the start of nest brooding allowed for close inspection of her eyes, which were visibly normal.

Secondly, it is not likely that she came into contact with another infected finch in the week after this time. Prior work on site fidelity of House Finches in northern Georgia showed that April is a time of low turnover of individuals (Davis 2008), and the fact that she was brooding at the onset of the infection means she was fairly sedentary and likely did not come into contact with many other finches. Furthermore, only 5 other House Finches were observed in the area at this time (2 other pairs nesting on the front porch, and her mate), all of which had no visible clinical signs.

If this female did spontaneously relapse, it would be consistent with prior experimental and theoretical studies. The seasonal occurrence of mycoplasmal conjunctivitis in House Finches in eastern North America is known to follow an annual pattern of low prevalence in the summer, a high peak in prevalence in the fall and early winter, then a secondary, smaller peak in the later winter/early spring (Altizer et al. 2004b). The reason for this recurring pattern in prevalence, especially the small spring peak, had not been clearly understood until Sydenstricker et al. (2005) experimentally demonstrated that House Finches can be re-infected with MG and develop conjunctivitis months after clearing an initial infection. This evidence points to the possibility that the spring peak is composed largely of recrudescing individuals. Furthermore, Hosseini et al. (2004) demonstrated with a modeling approach of citizen-science data that the spring peak was likely driven by recrudescing infections.

Regardless of how this female became infected, this report demonstrates how mycoplasmal conjunctivitis can negatively affect breeding success in House Finches. Furthermore, this represents one of the first observations of a nesting female succumbing to the disease, or at least the clinical manifestation of conjunctivitis, resulting in nest failure. Recall that in the surveys by Nolan et al. (2004) of nesting adults, they found no breeding birds with clinical signs, but 6 asymptomatic birds. More importantly, they found little evidence that MG infections negatively impacted the reproductive success of adult House Finches in terms of nestling mass and survival, though infected adults can pass infections to nestlings. The surveys by Hartup and Kollias (1999) also found no evidence of nest failure or nestling mortality from infection, though some nestlings were shown to have been exposed to the pathogen. The observations in the current report are in contrast to these prior studies, albeit they are based on one nest attempt, in that they show the most severe consequence of all (i.e., complete nest failure) caused by MG infection in a brooding female.

## Acknowledgments

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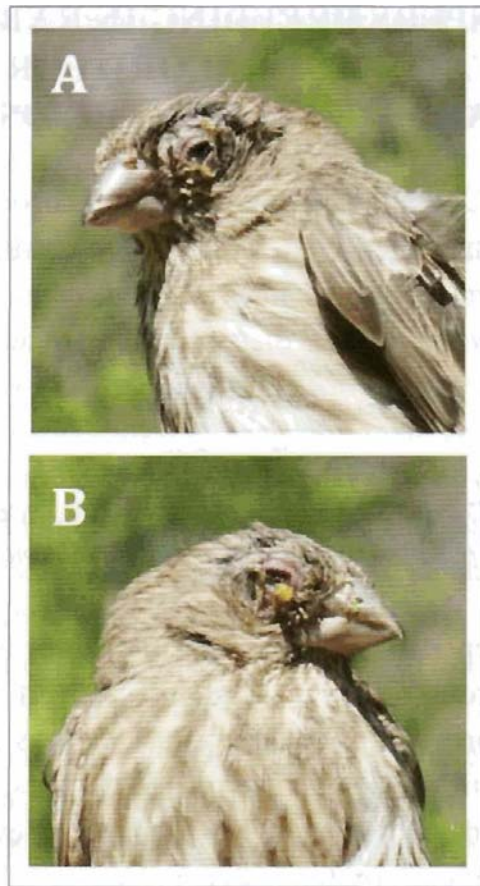


Figure 1. Photos of (A) left and (B) right eyes of the female House Finch with conjunctivitis in this study. Note the crusty discharge and the small ocular opening that resulted in the female being nearly blind.



Figure 2. Photo of one egg from the abandoned nest that was examined for viability. The unhatched dead chick appeared to be 2-3 days from hatching.