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What Came First, the Nest or the Egg? An Unusual Golden Eagle Nest Observed in Denali National Park and Preserve, Alaska

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LETTERS

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WHAT CAME FIRST, THE NEST OR THE EGG? AN UNUSUAL GOLDEN EAGLE NEST OBSERVED IN DENALI NATIONAL PARK AND PRESERVE, ALASKA

KEY WORDS: *Golden Eagle*; Aquila chrysaetos; *Alaska*; *breeding*; *egg*; *nest*; *reproduction*.

Golden Eagles (*Aquila chrysaetos*) build nests of branches, sticks, and twigs and line them with finer materials including grass, moss, and lichen (Kochert et al. 2002, Watson 2010). Nest size ranges from extremely small, with very few nesting materials, to very large (>6 m tall) with decades (and sometimes centuries) of nesting materials (Kochert et al. 2002, Ellis et al. 2009, Watson 2010). Nest-building behavior is exhibited year-round in resident populations, but occurs only during the breeding season in migratory populations (Kochert et al. 2002, Watson 2010). Golden Eagles often have several nests within their territory and lay eggs either in existing nests built in previous years (i.e., historical nests) or nests constructed in the same year that eggs were laid (Kochert et al. 2002, Watson 2010, Kochert and Steenhof 2012). Watson (2010) described several cases of eggs being laid away from nests, usually at or near roost sites, but suggested that this behavior was probably related to cold weather causing birds to eject eggs and abandon breeding for that year. Here we describe an unusual situation in which a Golden Eagle laid an egg on a ledge containing very few nesting materials prior to building the majority of the nest.

Denali National Park and Preserve (Denali) in interior Alaska contains one of the highest documented nesting densities of Golden Eagles in North America (Kochert et al. 2002). Golden Eagles that nest in Denali are migratory, leaving the area from late September through mid-October and returning from early March through early April. From 1988 to 2013, most nesting pairs completed their clutches by April 15 (C. McIntyre unpubl. data). Hence, nest building in Denali is limited to a period of 5–7 mo (C. McIntyre unpubl. data) and nests built and used in the year when eggs are laid must be constructed in just a few weeks.

On 25 April 2011, we conducted an aerial survey from a Robinson R-44 helicopter to document territory occupancy and breeding activities for Golden Eagles in our study area (see McIntyre and Schmidt 2012). As part of this survey we observed all known nests (historical nests) in the Riley Creek–Fang Mountain territory to document egg laying and/or nest refurbishment. Because we did not find evidence of egg laying and/or nest refurbishment at the two known historical nests in the territory, we searched cliffs and rock outcrops within 2000 m of each historical nest for new or previously undocumented nests. While slowly flying (ca. 20 knots) approximately 500 m in front of a large cliff complex, we observed a bright white streak of fresh whitewash below a ledge on the eastern edge of the lower and gray portion of the complex (Fig. 1). We made a second and closer flight in front of the cliff (ca. 75 m) and observed a lone egg on the ledge among a few sticks and clumps of moss and lichen (Fig. 2). We identified this as a Golden Eagle egg based on its size, shape, and location. We mapped the location, took photographs of the nest and nest cliff, and then left the area to continue our survey work. Aside from the egg, we did not observe any Golden Eagles associated with the territory during this survey.

On 13 July 2011, we conducted an aerial survey from a Robinson R-44 helicopter to document nesting success and fledgling production in our study area (see McIntyre and Schmidt 2012). During the survey, we revisited the Riley Creek–Fang Mountain territory and found a newly constructed nest (ca. 1.5 m long, 0.75 m wide and 0.5 m deep) that contained one nestling (ca. 35–42 d of age; Fig. 2) in the exact location where we observed the lone egg in late April. The nest included freshly broken branches and substantial amounts of fresh greenery, including *Betula* sp., *Cassiope tetragona*, and *Arnica* sp. (Fig. 2). We estimated the age of the nestling based on its plumage characteristics (C. McIntyre unpubl. data). By back-dating using an estimated nestling age of 35–42 d and an incubation period of 41–45 d (Kochert et al. 2002), we estimated that the nestling hatched from an egg that was laid between 17 and 28 April 2011. Hence, the nestling that we observed on 13 July 2011 hatched from the same egg we observed during our survey on 25 April or from an egg that was laid within 3 d after that survey.

We have documented 1019 Golden Eagle nesting attempts in our study area since 1988 (C. McIntyre unpubl. data). Several times, we observed Golden Eagles using very small nests with very little nesting material, similar to those described by Ellis et al. (2009). We have also observed Golden Eagles adding fresh nesting materials to occupied nests (where ''occupied nests'' were defined as those with eggs or nestlings) and unoccupied nests (i.e., those without eggs or nestlings), and building new nests throughout the breeding season. However, this is the first time that we have evidence of an eagle laying an egg on a bare ledge



Figure 1. The cliff complex along upper Riley Creek, Denali National Park and Preserve, Alaska, on 25 April 2011. The black arrow indicates the ledge and egg location. The nest cliff complex is approximately 60 m high and 110 m long.

with minimal nesting material and then essentially constructing a nest around the egg.

Ellis et al. (2009) emphasized the importance of documenting unusual raptor nests because they reveal the plasticity of a species' behavioral repertoire and stressed the importance of developing robust survey methods that will detect even the most unusual raptor nests. The discovery of the new but unusual nest in the Riley Creek–Fang Mountain territory in April 2011 illustrates that not only will Golden Eagles lay eggs in very small nests (Kochert et al. 2002, Ellis et al. 2009, Watson 2010), but they will continue to add a substantial amount of nesting material, basically building an entire nest, after they lay eggs. We agree with Ellis et al. (2009) that nests may go undetected if surveyors do not account for such high variability in nest size and nesting behavior of Golden Eagles. Golden Eagle nests can be cryptic (Ellis et al. 2009) and finding them on large cliffs can be very challenging, particularly if the surveyor is searching for larger nests. In our case, our efforts to look for new nests when the historical nests were unoccupied and to closely examine a splash of fresh whitewash near a ledge on suitable nesting substrate in this territory led us to discover a new and unusual nest and to document occupancy and breeding status of a historical nesting territory.

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Figure 2. (a) A lone Golden Eagle egg on a ledge surrounded by scant nesting materials on 25 April 2011, Riley Creek–Fang Mountain nesting territory, Denali National Park and Preserve, Alaska. The splash of fresh whitewash that led to the discovery of the nest is clearly visible in the bottom of the photograph. (b) A Golden Eagle nestling, 35–42 d old, in a newly built nest on 13 July 2011, Riley Creek–Fang Mountain nesting territory, Denali National Park and Preserve, Alaska.

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