Mottling in the Plumage of Juvenile Golden Eagles

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ABSTRACT

Criteria recently published for aging Golden Eagles (*Aquila chrysaetos*) do not allow for pale mottling in the secondary flight feathers or rectrices of juveniles. However, many juvenile Golden Eagles show barring and mottling in the secondaries. The tails of a considerable proportion of juveniles also have some rectrices blotched and mottled with gray just as extensively as is normal in second generation feathers. For central Montana, about 16% of juveniles show tail mottling. The presence of pale mottling in many juvenile wings and some tails renders the presence/absence criterion unreliable in aging Golden Eagles. The most reliable criterion for separating juveniles from all other age classes is the absence of second generation feathers at loci where the first pre-basic molt normally begins.

INTRODUCTION

This article clarifies common misconceptions in aging Golden Eagles (*Aquila chrysaetos*). In the most complete, detailed and, I believe, most accurate account yet published of Golden Eagle plumage features, Bloom and Clark (2001) provide three criteria for separating juvenile Golden Eagles from all other age classes. To wit, they state that in juveniles, (1) primaries, secondaries, and rectrices are all the same age, (2) secondaries show no gray marbling in the dark terminal zone, and (3) rectrices show no gray marbling in the black subterminal band. Close examination of live fledglings and juvenile museum specimens show that there are exceptions to all three rules.

METHODS

From four decades of visiting Golden Eagle eyries in ten states and Mongolia, and from limited fieldwork in Japan and Siberian Russia, I documented features of Golden Eagle plumage. I also visited 13 ornithological museums and further recorded plumage features of Golden Eagle specimens representing Europe, Siberia, North America (including Mexico), and much of Asia. Notes and photographs were made of normal, unusual, and aberrant plumage features.

RESULTS

From examination of juveniles (alive and in museums), I concur that the pigmentation criteria given by Bloom and Clark (2001) for identifying juveniles are true for most birds, but exceptions to one criterion are frequent and to the other criteria, not uncommon. As Bloom and Clark (2001) allow, one of their three criteria (i.e., that primaries, secondaries, and rectrices are all the same age) has occasional exceptions. Sometimes one or more feathers are dislodged while the eaglet is still in the nest and occasionally losses occur thereafter. Such prematurely lost feathers are replaced by second generation feathers that are not juvenal in appearance. These losses may be "random" or "adventitious," as Bloom and Clark (2001) term them (suggesting that physiological anomalies cause the premature casting of one or more feathers). I suggest that second generation feathers in otherwise juvenal plumage are more likely replacements for feathers dislodged by trauma while subduing prey, during combat with other eagles, upon injury by predators, etc.

Exceptions to Bloom and Clark's (2001) second and third criteria (i.e., that gray marbling [mottling, blotching, and barring] is not found in the black zones in the secondary flight feathers or rectrices in juvenal plumage) are the primary focus of this manuscript. Again Bloom and Clark (2001) are correct: marbling is infrequent in the black zone on the juvenal tail, but, contrary to their statements, a limited amount of barring and mottling in the secondaries is common. In fact, Photo 1 in their paper illustrates a juvenile with inconspicuous barring in the secondaries. Keith Brockie illustrated a juvenile with extensive mottling and barring in the secondaries (Watson 1997:199), and my Photo 1 illustrates an extreme example of gray barring and mottling in the wing of a recently fledged juvenile. For another Montana juvenile (Photo 2), barring/mottling in the dark zone of the juvenal wing (especially in the primaries) is as great or greater than for birds in the older age classes illustrated by Bloom and Clark (2001).

Bloom and Clark's (2001) third criterion for distinguishing juvenile birds is the absence of gray mottling in the black zone in the juvenal tail. However, in my Photos 3-6, mottling in the tail is sometimes extensive. When using the Bloom and Clark (2001) mottling criteria as a guide, such feathers, if retained in the tail of a subadult, would be judged to be at least second generation and, as a result, the bird would be classed one or two years older than its true age.

Less confusing are the tails of two other juveniles (Photos 7, 8) which show white continuing through the dark band to the tip on a central (Photo 7) and non-central (Photo 8) rectrices. Jollie (1947) earlier published drawings of feathers somewhat like those in Photos 5 and 7. Walter Spofford (pers. comm.) told me many years ago of examining a dead juvenile in Texas with almost no black band on the tail, and Crane and Nellist (1999:34) spoke of seeing two recently fledged eagles on the Isle of Skye (Scotland) with almost no black visible on the tail tip. Unfortunately, these juveniles were neither photographed nor examined in the hand, so those records are incomplete. However, the photographs accompanying this article demonstrate the inadvisability of making all encompassing pigmentation rules, even for non-aberrant specimens.

DISCUSSION

Most of the juveniles used herein are from central Montana, but some juvenile Golden Eagles from Eurasia also are exceptions to the no-mottling rules. These include five specimens from the American Museum of Natural History showing mottling in the black band on the juvenal tail: the first (535085) is from southeastern European Russia (Orenburg area), two are from central Spain (535109 and 461181), and two are from Sardinia (535101 and 535521). Secondary, but not tail, mottling was noted in live fledglings in northwest Siberia and Mongolia. The frequency of occurrence of exceptions to the Bloom and Clark (2001) criteria is a topic needing study. The small number of specimens available for inspection at the museums I visited do not allow for regional frequency estimates. However, for Montana, where I closely examined 32 fledglings, five (16%) (Photos 3-6) showed heavy mottling in the tail. Barring or mottling in the secondaries, another exception to Bloom and Clark's (2001) criteria, was common (Photos 1 and 2), and one bird (Photo 9) showed barring in the proximal primaries much like that for a *Buteo*.

Finally, Bloom and Clark (2001) also assert that "juvenile feathers all show the same wear and amount of fading. . . ." As evident in Photos 7 and 8, the white zones on the central rectrices are, after several months of wear, frayed and shredded while more lateral rectrices, hidden from the sun beneath more central feathers, show much less wear. This uneven wear phenomenon is a major focus of another paper (Ellis and Kéry 2004) but deserves mention here. Differential wear is also found in other topographic regions and sometimes for reasons other than differential exposure to the sun. Most conspicuously, at the dorsal elbow region, tertials and wing coverts are consistently less color saturated and normally fade more than adjacent secondaries and scapulars. The medial and lesser upper wing coverts also bleach more rapidly than do adjacent greater upper wing coverts. Differential fading is generally present in Golden Eagles except for juveniles in fresh

Photo 1.
An extreme example of barring and mottling on the proximal primaries and distal secondaries (juvenile Golden Eagle about one month after fledging, central Montana, 3 Aug 1973).

Photo 2.
Pale gray barring and mottling in the wing of a juvenile Golden Eagle (about one week after fledging, central Montana, 9 Jul 1971). Artificial bleaching visible on under wing coverts was for long-term identification of this individual (Ellis and Ellis 1975).

Photo 3.
Pale gray mottling of juvenal rectrices at loci L 1, 2, and 3, and R 1 and 2 (less than one week after fledging, central Montana, 15 Jul 1972).

Photo 4.
Pale mottling in the tail of a juvenile Golden Eagle (about one week after fledging, central Montana, 8 Jul 1972).

Photos 5 and 6.
Tail of juvenile Golden Eagle from central Montana. This is the same individual as in Photo 1.

Photo 5.
Upper surface. 14 Jul 1973 (about 10 days after fledging) shows pale gray and white mottling to the tip.

Photo 6.
Under surface. 3 Aug 1973 (about one month after fledging).

Photo 7.
Juvenile Golden Eagle showing interruption of black tail band at center of tail. Specimen from Siberia, 1893: British Museum.

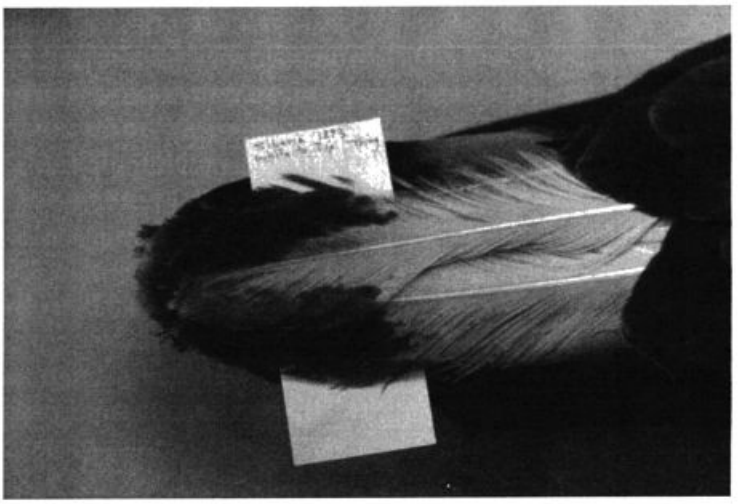

Photo 8.
Juvenile Golden Eagle showing interruption of black tail band, not at the center of tail, where pale zones are more common, but near the edge of the tail. Specimen from Northwest Territories, Canada, U.S. National Museum No. 365,114.

Photo 9.
Upper surface of the wing of the same juvenile as in Photos 1, 5, and 6. Primary barring and mottling is extreme here.

plumage, so contours of the juvenal plumage, after a few months, do not show the same amount of wear or fading everywhere, and failure to recognize this could result in an incorrect assessment of the age of a juvenile or subadult bird. For example, if a retained juvenal rectrix is from a solar-protected locus (e.g., R or L 3-6), a field biologist would be tempted to conclude that a three-year-old bird is only two years old. Likewise, heavily faded tertials and upper wing coverts on an otherwise dark winter juvenile may persuade a bander, using Bloom and Clark's (2001) even fading/wear criterion, to conclude that the bird is not in juvenal plumage.

The foregoing paragraphs beg the question: without using the pigmentation/fading criteria offered by Bloom and Clark (2001), is it possible to identify juvenile Golden Eagles safely? Of course. As stated by Pytor Sushkin (1900) long ago, ". . . the first plumage . . . is the only . . . uniform garb assumed during the bird's life. All subsequent plumages are mixed . . ., consisting . . . of worn feathers and new . . . ." This "uniform garb" is identifiable readily through the first winter. By spring, the "gold" nape feathers, the central rectrices (L and R 1), the tertials, and the medial and lesser upper wing coverts are much more bleached than elsewhere on the bird; but, until well into the "first" molt, it is still possible to distinguish yearling eagles from birds even one year older, even from a distance. As stated by Bloom and Clark (2001) and other authors which they cite, older birds (non-juveniles) show two (or more) generations of remiges and rectrices while in flight. Also, when perched, non-juveniles present a mosaic of fresh (dark) and old (pale) feathers (except on the head, undertail coverts, and underwing coverts which are replaced nearly completely during one molting season [unpublished data]). This mosaic of old and new is subtle on the venter, conspicuous on the upper surface of the wing, and most conspicuous in the elbow area. When aging birds in the hand, the data on molt sequence presented by Bloom and Clark (2001) should be sufficient during the first three years.

Other less conspicuous traits (e.g., more pointed tips of juvenile remiges readily seen in fresh plumage) offered by Bloom and Clark (2001) will also help, especially if the field biologist is aware that remiges and rectrices are sometimes mottled with gray as described herein.

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