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NOTES ON EGGS OF THE BICOLORED HAWK *ACCIPITER BICOLOR*

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Little is known of the breeding habits of Neotropical accipiters, including the widely distributed, but inconspicuous, Bicolored Hawk (*Accipiter bicolor*). From 1991–94, we conducted a study of the breeding biology of this species in Tikal National Park in NE Guatemala. Here, we provide details on Bicolored Hawk eggs found at Tikal and compare them to earlier published descriptions, including some that were probably misidentified.

Fourteen Bicolored Hawk eggs from six nests at Tikal were dull white, unspotted, nonglossy and subelliptical in shape (Preston in Palmer 1962). The inner surface of the shells had a light bluish or greenish tinge, as is typical of many *Accipiter* species (Bent 1937, Schönwetter 1961). As measured in the field with Vernier calipers, they averaged 47.1 ± 1.1 mm (\pm SD, range = 44.9–49.0) \times 36.5 ± 1.1 mm (range = 35.0–38.6), and the average mass of eggs at various stages of incubation was 33.5 ± 3.5 g (range = 28.0–38.0), as taken with a 100 g Pesola spring scale. Overall, the eggs closely resembled those of the related Cooper's Hawk (*Accipiter cooperii*), aside from their slightly greater "elongation" (length/breadth ratio) (i.e., 1.29 [this sample] vs. 1.26 [$N = 172$ for the Cooper's Hawk, Kiff unpubl. data]). Only clutches of 1–3 eggs were observed at Tikal with an average clutch size of 2.4 eggs.

These details differ from some published descriptions of Bicolored Hawk eggs and museum specimens attri-

buted to this species, but they agree with others (Table 1). In order of their collecting year, other purported eggs of this species include the following: Chubb (1910) reported that three eggs, probably representing a single clutch, of the race *A. bicolor pileatus*, taken in Paraguay (locality unknown) on 19 October 1902 were "dull white without any markings beyond a few underlying cloudings of a somewhat darker tint." They measured 1.8–1.9 in (46–48 mm) \times 1.4–1.5 in (36–38 mm), thus agreeing closely with the Bicolored Hawk eggs from Tikal. Based on these sparse details, there is no reason to doubt the authenticity of these eggs.

A set of two purported Bicolored Hawk (*Accipiter b. bicolor*) eggs taken near Bartica, British Guiana on 13 April 1927 for the British collector G.D. Smooker is in the Western Foundation of Vertebrate Zoology collection (WFVZ 16 695). According to the accompanying data, the species identity was based on a description of the birds. The eggs were in an advanced stage of incubation, and the nest was said to be "composed of sticks and placed high up in a tree—no further particulars given." The egg measurements were noted on the data card as 42.0×32.8 and 42.6×33.1 mm. The collector of the set was noted as "a native," probably indicating that Smooker did not visit the nest himself. Other misidentified raptor eggs have been reported from the Belcher-Smooker Trinidad collection (e.g., Boyce and Kiff 1981, French 1973, Kiff 1981); thus, all records from Smooker, who evidently relied heavily on native collectors, should be viewed with caution.

Table 1. Comparison of Bicolored Hawk (*Accipiter bicolor*) eggs from Guatemala with earlier published accounts and unreported museum specimens. See text for additional details on egg appearance and nests.

AUTHORITY (YEAR) (N)	LENGTH (mm)	BREADTH (mm)	COUNTRY (YEAR COLLECTED)	PROBABLE AUTHENTICITY
This study (N = 14)	47.1 (44.9–49.0)	36.5 (35.0–38.6)	Guatemala (1991–93)	Authentic
Chubb (1910) (N = 3)	46–48	36–38	Paraguay (1902)	Authentic
G.D. Smooker (WFVZ 16 695)	42.02, 42.75	33.06, 33.31	Brit. Guiana (1927)	Misidentified
Hewitt (1937)	38	32.75	Venezuela (1936)	Misidentified
Housse (1945)	44	34	Chile (year?)	Indeterminate
Schönwetter (1961)	37.0, 41.3	31.0, 32.6	Not given	Misidentified
Schönwetter (1961)	46.5	35.2	Ecuador (1961)	Authentic?
Wolfe (1964) (WFVZ 16 694)	46.27	36.15	Mexico (1961)	Authentic
F.F. Nyc, Jr. (WFVZ 145 391)	46.9, 48.4	36.4, 36.1	Mexico (1970)	Authentic

This set was mentioned by Wolfe (1964), who described their appearance as a "grayish white ground color and both are sparingly flaked with light yellowish brown." He gave the measurements as 42.0×32.8 and 42.6×33.1 mm. This set was reexamined in October 1998, and similar measurements (41.02×33.06 and 42.75×33.31 mm) were obtained. Both eggs are short subelliptical in shape (Preston *in* Palmer 1962), and they are dull white with faint light brown splotches and darker brown markings that may be nest stains. Since they differ so conspicuously in both color and size from the Tikal eggs, they were almost certainly misidentified.

Hewitt (1937) attributed a single egg taken on 28 April 1936 in the Rio Orinoco District, Venezuela to the Bicolored Hawk. The egg was white with faint nest stains and was marked with thin, rust-colored streaks (interpreted as pigmentation, although they were probably blood stains). It was said to exhibit a greenish tinge when held before a strong light. It measured only 38×32.75 mm, thus being about one-third smaller in volume and much more spherical (elongation = 1.16) than the Tikal eggs of this species. The nest was described as a small cup composed of dry sticks and lined with a few leaves and situated at the end of a branch 50 ft above the ground. The bird was said to have been identified on the nest. Seventeen Bicolored Hawk nests at Tikal were located in forks in main tree trunks, where they were supported by large branches or vines, or near the tops of trees supported by several strong branches. None were found at the end of branches, a nesting situation more typical of several Neotropical kite species, and all were well-concealed from below. As Hewitt was not known to have personally collected eggs in South America, he presumably obtained the specimen from some other collector or

(more likely) from a commercial dealer. Given these discrepancies, we conclude that this specimen was misidentified.

Housse (1937) provided various unconvincing details on nests and eggs purportedly of the Chilean race, *Accipiter bicolor chilensis* (often regarded as a separate species, e.g., Johnson 1965, del Hoyo et al. 1994). Nests of the species were said to usually be in the forks of tall trees inside the forest, but close to a clearing or open country, and made of dry or green twigs, closely interlaced and lined with dry grass so as to provide a smooth and rounded finish to the inner cup. Housse claimed that four eggs was the usual clutch, but that there were sometimes even five or six eggs in a nest. The eggs were described as nearly elliptical, smooth but somewhat thick-shelled, white with large yellowish or greenish blotches concentrated around the larger pole and with numerous small yellow and gray spots elsewhere. Measurements were given as 44×30 mm in the earlier reference (Housse 1937), but as 44×34 in Housse (1945). The clutch size, egg measurements, color of egg markings and the nest description is more suggestive of some other species, perhaps the Chimango Caracara (*Milvago chimango*); at least they do not agree in these details with known authentic Bicolored Hawk eggs and nests. It is worth mention that the egg size and color description given in the Bicolored Hawk species account in Brown and Amadon (1968), which seem to be for *A. bicolor chilensis*, were actually those from Wolfe's (1964) description of Mexican eggs.

Schönwetter (1961) gave the measurements of two purported eggs of the race *A. bicolor pileatus* as 37.0×32.6 and 41.3×32.6 mm, far below the likely range of measurements for eggs of the Bicolored Hawk. No details on locality or collector were provided. Another egg listed

by Schönwetter, apparently from western Ecuador and said to be from the Pässler collection, has more credible measurements of 46.5×35.2 mm, and based solely on these data, it may be authentic. Because the size of this specimen differed from the one reported by Hewitt (1937), Wetmore (1965) regarded (wrongly, we think) the former specimen as genuine and this one as misidentified. This egg would be from the nominate race *bicolor*, although birds from western Ecuador have sometimes been regarded as a separate race, *A. b. schistochlamys* (cf. Hellmayr 1949).

Wolfe (1964) described an egg of the race *Accipiter bicolor fidens* he collected in northern Veracruz, Mexico on 6 May 1961, with the assistance of R. Reyes, as "very light bluish gray without markings." He gave the measurements as 46.2×36.1 mm. This specimen is in the Western Foundation of Vertebrate Zoology collection (WFVZ 16684), where it now appears as dull white, lacking pigment, but with some faint nest stains. It is subelliptical in shape. The nest was placed about 80 ft (24.4 m) from the ground in an old nest of the Common Black-hawk (*Buteogallus anthracinus*) in thick woods along a stream. The old nest had been lined with a few small twigs and some green leaves. Wolfe was a well-respected authority on raptors and their eggs, and there is no question that this egg is authentic. The original color of the egg, i.e., "light bluish gray," is typical of many fresh-laid Cooper's Hawk eggs (Bent 1937), but the bluish color fades during incubation. Wolfe's specimen was "fresh" when it was collected.

The Western Foundation collection contains another set (WFVZ 145391) taken by the late Fred F. Nyc, a Texan oologist who made frequent collecting forays into Mexico from the 1940s to the early 1970s, often in the company of fellow oologists Col. Wolfe and Dr. Travis Meitzen. We knew Nyc well and judged him to be a reliable, knowledgeable collector. According to the accompanying data card, Nyc collected the set about 12 mi (19.3 km) southwest of Tampico, Tamaulipas, Mexico "in the oil fields" on 20 March 1970. The eggs were fresh, and the collector suspected that the set was incomplete. Identification of one (or both?) of the birds was based on a half hour of observations with binoculars from a distance of 50 ft. The nest was described as about 10 ft (3.1 m) high in a "straggly" mesquite tree in open country, and it was lined with grass and a few green leaves.

We examined and measured the Nyc eggs on 18 October 1998. Their shape is subelliptical, and they measure 46.85×36.32 and 48.36×36.02 mm. Both are dull white with a sprinkling of fine brown spots on the large end; one of the eggs is more heavily marked than the other. In all details other than the markings, the egg is virtually identical to one (WFVZ uncat.) we collected at Tikal, although it also bears dark nest stains which might be interpreted as pigmented markings. Faint brown spots and splotches, many below the outer cuticle and often heavier at the larger end, are typical of Cooper's Hawk eggs

(Bent 1937, Palmer 1962), so it is not unlikely that some Bicolored Hawk eggs also bear such markings.

The coastal locality and the open habitat, unlikely for this deep forest species (Howell and Webb 1995), might cast doubt on the authenticity of this set, or at least on the associated data. However, Nyc noted on the data card that he had found a nest of this species containing a clutch of five eggs in the same area on 20 May 1952. On this date, one of the eggs in this clutch had just hatched, two had pipped and the other two were addled. All were so badly oil-stained that Nyc expressed surprise that they could have remained viable. His field notes indicate that a bird was shot at the nest, presumably to identify it. A clutch size this large would be unexpected for a tropical accipitrid, but perhaps it is typical at the relatively high latitude of southern Tamaulipas.

In summary, we regard the specimens of Chubb (Paraguay), Nyc (Mexico) and Wolfe (Mexico) to be authentic, and the eggs reported by Schönwetter from Ecuador were probably authentic. Based on a comparison with the Tikal sample and other details, the eggs reported by Hewitt (Venezuela), Schönwetter (*A. b. pileatus*) and Smooker (British Guiana) were probably misidentified. The ambiguous details provided by Housse on eggs from Chile do not permit any conclusion to be drawn about their authenticity.

These examples illustrate both the strengths and weaknesses of museum collections. Younger researchers, who may not have grown up in a collecting tradition, should regard museum specimens as an essential resource, but they should view specimen data (especially for egg sets) with the same critical eye they would apply to any other data set. Ideally, all trained field workers in poorly studied regions should be encouraged to add material to museum collections as possible, even if only opportunistically from salvaged material, since even for such a widespread species as the Bicolored Hawk, which occurs from NW Mexico south to Tierra del Fuego, there is a dearth of usable oological specimens with reliable modern data.

RESUMEN.—Una comparación de las descripciones publicadas de huevos de *Accipiter bicolor* con las características 14 huevos conocidos en seis nidos guatemaltecos estudiados entre 1991–94, indica que muchos de los reportes anteriores fueron probablemente basados en la identificación equivocada de especímenes. Los huevos de *Accipiter bicolor* reportados en Paraguay (Chubb), México (Nyc, Wolfe) y Ecuador (Schönwetter) parecen auténticos, pero los especímenes de Venezuela (Hewitt) y Guyana (Smooker) están erróneamente clasificados. La identificación actual de huevos de Chile (Housse) es errada.
[Traducción de César Márquez]

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