HAVE THE EGGS OF THE ORANGE-BREASTED FALCON (*FALCO DEIROLEUCUS*) BEEN DESCRIBED?

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The only published description of Orange-breasted Falcon (*Falco deiroleucus*) eggs known to us is that of Coltart (1952), who presented details on two sets of eggs said to be of this species collected for G. D. Smooker in Trinidad. One of these sets, a clutch of 3 taken on 28 March 1937 in the Aripo Savannah, is now in the collection of the Western Foundation of Vertebrate Zoology (WFVZ cat. no. 15,728); the other, a set of 2 collected on 21 April 1930 in the Coroni Marshes, is in the collection of the Zoological Museum, University of Helsinki, Finland (ZMUF cat. no. 15,721).

The authenticity of these eggs has been questioned by ffrench (1973) because of their small size compared to the body size of the species. The 3 eggs in the WFVZ collection measure 40.6 × 34.7, 41.8 × 35.6, and 39.9 × 34.6 mm, and the 2 eggs in the ZMUF set measure 43.0 × 35.0 and 42.2 × 34.7 mm. All of these measurements fall within the range given for eggs of the Aplomado Falcon (*Falco femoralis*) by Bent (1938) and Brown and Amadon (1968) and are only slightly larger than the extreme measurements known for eggs of the much smaller Bat Falcon (*Falco rufigularis*) (Brown and Amadon op cit., Kiff unpubl. data). Eggs of several falcon species, including one of Smooker's Trinidad eggs, are shown in Figure 1 to illustrate their comparative sizes.

Heinroth (1922) first demonstrated the fundamental relationship between egg weight and body weight in birds, and this was further refined by Huxley (1923–1924). Amadon (1943), Lack (1968), and Rahn et al. (1975) have presented evidence that suggests that each group of related birds (at least to the subfamily level) has a characteristic proportionality constant, which expresses the rate at which egg size increases to that of body size increase. It is possible, therefore, to derive individual regression equations to express the relationships between these parameters for particular groups of birds and to predict fairly closely body weight from egg weight, or vice-versa.

We obtained data on egg size and female body weight for 12 *Falco* species, representing the entire size range found in the genus (Table 1), and plotted the log of female body weight against the log of egg length (L) × egg breadth (B), a size index that is highly correlated with actual egg weight (Anderson and Hickey 1970). The resulting regression line ($r^2 = 0.92$) is shown in Figure 2. The Orange-breasted Falcon data point lies well away from the regression line. Based on the mean weight of 605 g (n = 7) for

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female Orange-breasted Falcons, the log LB for the species (assuming a sample size of 20) should be 3.26. When this figure is plotted against egg breadth a value of 37.5 mm for Orange-breasted Falcon egg breadth is predicted. When that figure is divided into the product of L × B, an estimate of 48.0 mm for Orange-breasted Falcon egg length is obtained. The 95% prediction interval for these values range from 44.0 to 52.1 mm (L) and 33.8 to 40.0 mm (B); Smooker's sets fall outside this range in length and just inside in breadth.

Table 1. Mean egg size and female body weight of *Falco* species.

	Species	Code	Egg Size (mm) (Length × Breadth)	Log L·B	♀ wt. (g)		Log wt.	Source
American Kestrel	*F. sparverius*	A	35.15 × 28.92	3.007	142.2	(13)	2.15	6
Red-footed Falcon	*F. vespertinus*	B	35.34 × 29.59	3.038	182.2	(5)	2.26	3
European Kestrel	*F. tinnunculus*	C	39.82 × 31.37	3.097	230.4	(20)	2.36	3
Merlin	*F. columbarius*	D	40.21 × 30.84	3.094	212.0	(14)	2.33	2
Bat Falcon	*F. rufigularis*	E	40.80 × 31.81	3.118	220.0	(13)	2.34	4
European Hobby	*F. subbuteo*	F	41.82 × 32.86	3.138	229.0	(10)	2.36	9
Eleonora's Falcon	*F. eleonora's*	G	41.92 × 34.30	3.160	388.0	(11)	2.59	7
Little Falcon	*F. longipennis*	H	44.48 × 33.14	3.169	310.0	(4)	2.49	5
Aplomado Falcon	*F. femoralis*	I	44.26 × 34.79	3.188	406.0	(8)	2.61	10
Brown Hawk°	*F. berigora*	J	51.66 × 39.28	3.308	505-635	(4)	2.89	5
Prairie Falcon	*F. mexicanus*	K	52.01 × 40.18	3.320	863.0	(31)	2.94	8
Peregrine Falcon	*F. p. peregrinus*	L	51.27 × 40.72	3.320	1010.0	(17)	3.00	5
Gyrfalcon	*F. rusticolus*	M	59.17 × 45.92	3.434	1470.0	(10)	3.17	1

°We used the Brown Hawk egg data only in Fig. 3 and Eleonora's Falcon data only in Fig. 2. Code letters are those used in Figs. 2 and 3. Egg sample size is 20 per species; sample sizes for female body weights are given in parentheses. Sources of data: 1 = Mattox (1970), 2 = Cramp (1980), 3 = Dementiev and Gladkov (1954), 4 = Kiff (unpubl. data), 5 = Brown and Amadon (1968), 6 = Porter and Wiemeyer (1972), 7 = Walter (1979), 8 = Enderson (1964), 9 = Glutz von Blotzheim et al. (1971), 10 = Hector (pers. comm.)

In addition to the small size of the eggs, there are other reasons to doubt their authenticity. In a long paper on the habits of Trinidad and Tobago birds which Smooker co-authored (Belcher and Smooker 1934–1937), the only allusion to breeding in the Orange-breasted Falcon account is the tentative statement, "we think it a resident," despite the fact that the 1930 set had been taken years earlier. The Orange-breasted Falcon has always been regarded as exceedingly rare in Trinidad, and there is as yet no additional evidence that it breeds there (ffrench 1973). Both sets of eggs were taken for Smooker by a native, apparently the same one in each instance, and Smooker may never have seen the nesting birds personally. Several other instances of misidentification of eggs in the Belcher-Smooker Trinidad collection have been reported (ffrench 1973, Kiff in press), probably resulting from errors by native helpers, rather than dishonesty on the part of the collectors.

Three falcon species, the Aplomado Falcon, Bat Falcon, and American Kestrel (*F. sparverius*) are known to nest in Trinidad. The eggs of the latter are so much smaller than the ones in question that it can safely be ruled out as a candidate for laying them. The Smooker eggs are most similar in size to those of Aplomado Falcons and plotting the measurements of the questionable eggs against mean female Aplomado Falcon body weight yields a point very close to the one seen for the species (Fig. 2). Both nests, however, were said to be in cavities, one (WFVZ no. 15,728) being "30 feet up in a knot-hole in a ceiba tree," whereas the other was "in the hollow at the base of a palm-branch

about 40 feet up" (Coltart 1952). According to Dean Hector (pers. comm.), who has studied the species intensively, there is no recorded instance of Aplomado Falcons nesting in such cavities. The nest descriptions are virtually identical to those which Smooker gave for sets of Bat Falcon eggs collected for him in Trinidad and now in the WFVZ collection, but the eggs would be unusually large for that species. We plotted egg breadth against egg length for twelve species of falcons and constructed a 90% prediction interval for the genus. The set deposited in the WFVZ lies outside this interval (Fig. 3) and the other set lies on the line. This suggests that these purported eggs may not even belong to the genus! Interestingly, the eggs are most similar in color and size to those of the Yellow-headed Caracara (*Milvago chimachima*) (a genus related to *Falco*), but that species is rare in Trinidad and is not known to breed there (ffrench 1973). We constructed a 95% confidence interval for a random sample of Yellow-headed Caracara eggs (n = 20) and noted that the Orange-breasted Falcon eggs lie on both sides of the lower limit (42.59 × 34.56 mm).

   Thus, it is impossible to identify Smooker's alleged Orange-breasted Falcon eggs unequivocally, but it is virtually certain that they are not eggs of the Orange-breasted Falcon and that the eggs of that species await formal description.

Acknowledgements

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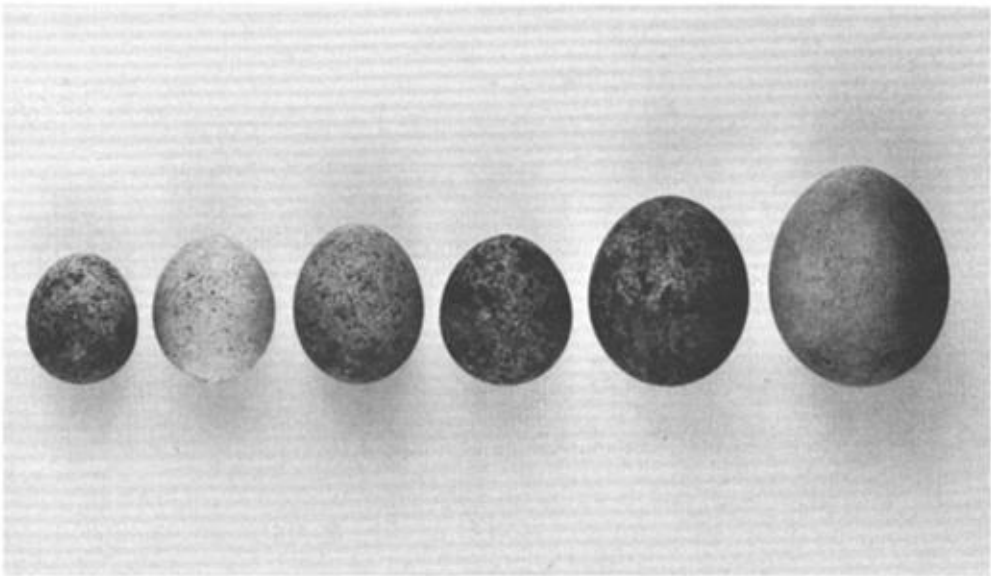

Figure 1. Falcon eggs arranged in order of increasing female body weight from left to right (American Kestrel, Bat Falcon, Aplomado Falcon, Orange-breasted Falcon, Peregrine Falcon, Gyrfalcon). Note the incongruity of the Orange-breasted Falcon egg location in the sequence.
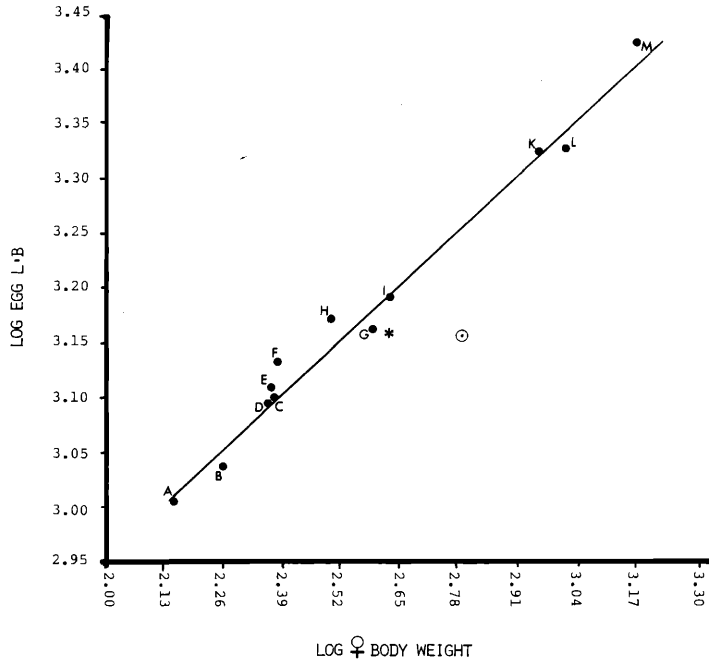
Figure 2. Regression line of log egg length times breadth (L·B) with log female body weight for several *Falco* species. Open circle shows the deviant data point for the Orange-breasted Falcon based upon Smooker's purported eggs. The asterisk shows the location of these eggs plotted against Aplomado Falcon weight. Egg size of the Orange-breasted Falcon based on female weight should fall on the regression line immediately above the purported clutch. See Table 1 for letter codes.
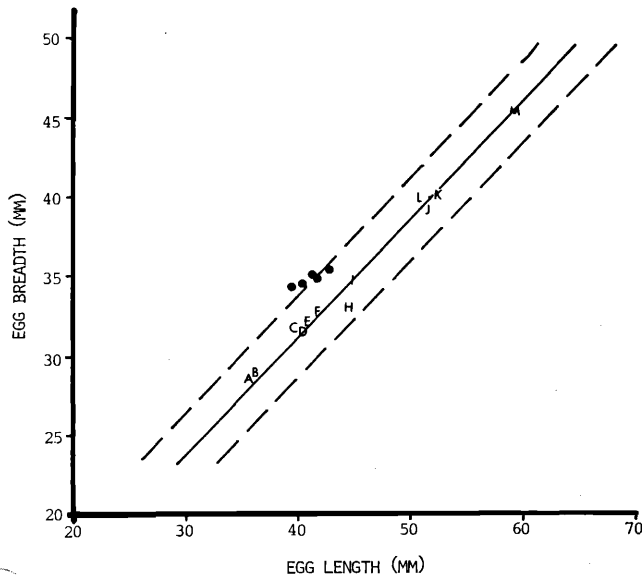

Figure 3. *Falco* egg breadth regressed with egg length. The dotted lines show the 90% prediction interval for the genus. Note that three Orange-breasted Falcon eggs (black dots) lie outside the line and two lie on the line. The three outlying eggs are in the WFVZ collection. For letter codes see Table 1.