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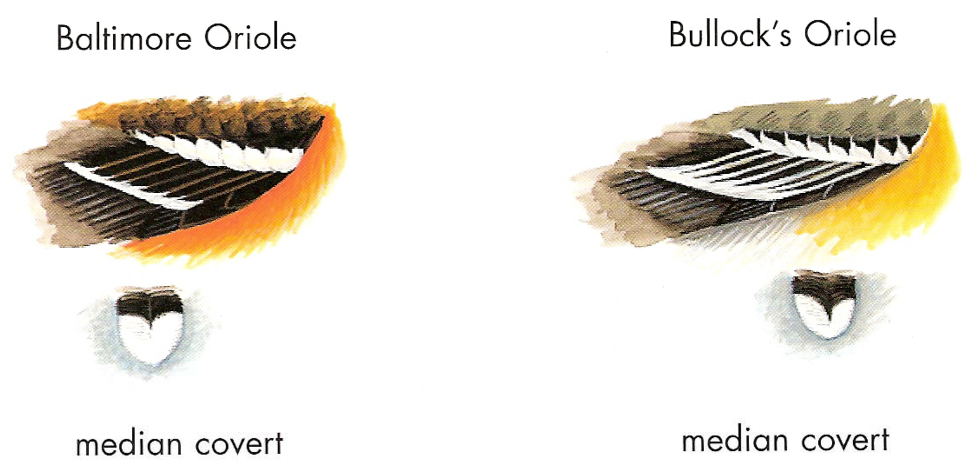
point/counterpoint

Wing covert pattern as an aid to identifying female and immature Bullock's and Baltimore Orioles—Another look

For some time, I have been interested in the identification of female and immature Bullock's Oriole (*Icterus bullockii*) and Baltimore Oriole (*I. galbula*), so it was particularly exciting to read Lee and Birch's (1998) fine article reviewing this identification problem (August 1998). Specifically, I was very interested in the new field mark that they describe, the difference in median covert pattern between the two species (Figure 1). Basically, Baltimore Oriole is described as such: "the bases of the white tips on the median covert feathers are shallowly indented by the black feather centers, particularly for those feathers nearest to the leading edge of the wing. This gives the black feather centers a squared-off appearance. As a result, the upper wingbar…appears to have a smooth upper border..". In contrast, the Bullock's Oriole is described as follows: "The bases of the white tips on the median covert feathers are more deeply indented by black feather centers than are those of the Baltimore. …..the black feather centers on Bullock's tend to form tapered, triangular points. As a result , the upper wingbar has a distinctive serrated appearance in the field."

Given that the identification of this pair of orioles ranges from extremely easy to exceedingly difficult—depending on

Figure 1. Wingbars in the two oriole species as originally presented by Lee and Birch (1998), artwork by Andrew Birch.



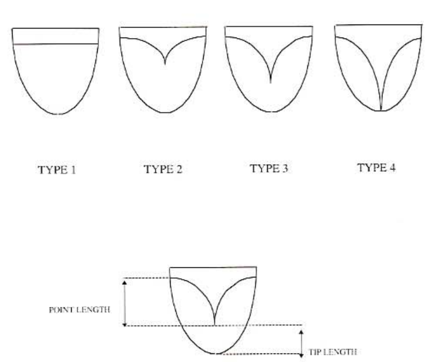


Figure 2. Four covert types and measured features, as presented by Alvaro Jaramillo.

	AVERAGE	AVERAGE	RANGE	RANGE
	POINT LENGTH	TIP LENGTH	POINT LENGTH	TIP LENGTH
BALTIMORE ORIOLE	0.93	6.24	0-2.9	1.9-13.1
BULLOCK'S ORIOLE	1.76	2.44	0-3.9	0.8-5.0

Figure 3. Averages and ranges for Point Length and Tip Length.

TYPE	BALTIMORE	%	BULLOCK'S	%
1	9	47.4	3	5.6
2	7	36.8	21	38.9
3	3	15.8	30	55.6
4	0	0.0	0	0.0

Figure 4. Summary of different covert types by species.

Figure 5

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Figures 5 and 6.
These two photographs show an in-the-hand immature female Bullock's Oriole, photographed on 13 April 1999 at Half Moon Bay, California. This bird can be aged by the fresher coverts, as compared to the primary coverts and alula, and, therefore, these median coverts are of the first basic generation, not juvenal coverts.

what age or sex one is looking at—their new field mark could very well solve many of the identifications on the difficult end of the continuum. However, as part of the research for a book on the blackbirds (Jaramillo and Burke 1999), neither I nor the artist noticed this difference, and we wondered if we had just overlooked it or had not noted a consistent pattern. To attempt to understand the value of the median covert pattern as a field mark, I decided to re-examine a series of specimens in a more focused manner to see what they would show. The methodology was simple. I examined only female and juvenile birds; no immature (First Basic) males or adult males were looked at. This is because it is only the duller plumage types which are difficult to identify, and where this wing-bar feature would be most useful.

I examined the median coverts on the left wing, taking measurements on the fourth or fifth median covert from the inside (proximal end of the row).

I classified each covert into a type (Figure 2) ranging from 1 to 4. The differences in the covert types are due to the extent and shape of the dark feather center. Type 1 is characterized by a straight lower border to the dark center, not extending down the rachis (shaft) of the feather as a point. Type 2 has the dark feather center extending down as a point along the rachis, but the extent is less than 50 percent of the distance between where the white of the terminal portion of the feather and the dark base meet at the inner (proximal) edge of the feather and the tip of the feather. Type 3 is similar to Type 2, but the extent of the point is greater than 50 percent of this distance. Type 4 has a point so long and extreme that it reaches the tip of the feather, along the midline.

Two measurements were taken on each feather; one was the Point Length and the other the Tip Length (Figure 3). The Point Length was defined as the length of the dark point along the shaft of the feather, measured from level where the white of the terminal portion of the feather and the dark base meet at the inner edge of the feather to the end of the central dark point. The Tip Length was the amount of white on the tip, past the dark point measured along the shaft of the feather. All measurements were taken to the nearest tenth of a millimeter with dial calipers. The specimens used were part of the Museum of Vertebrate Zoology collection at the University of California, Berkeley—one of the collections that Lee and Birch (1998) used for the development of this identification feature.

I was able to measure a total of 19 Baltimore Orioles and 54 Bullock's Orioles. The results of the measurements confirmed what Lee and Birch (1998) stated: the two species do differ in their general pattern. However, these differences are not absolute and are not diagnostic. Note that almost all coverts were easy to score as one of the four types, but a few were less straightforward. In these cases one had to move to another part of the median coverts in order to find a feather that was easier to score. In almost all situations this was a case of finding a feather that was more symmetrically patterned. Note that measurements were always made on the side which is not hidden by adjacent coverts on the folded wing. From my reading of the Lee and Birch article, covert types 1 and 2 should be found only on Baltimore Orioles, while types 3 and 4 should be found only on Bullock's Orioles. Figure 4 shows that in my sample no individual had a type 4 covert. Type 3 was the most common pattern on Bullock's Oriole, as expected, but there were also a substantial number of type 2 coverts and even a few type 1 coverts. Baltimore Orioles most commonly showed type 1 coverts, again as predicted, but there were a substantial number of Type 2 and even Type 3 coverts. Therefore, even with this reasonably small sample it is clear that there is complete overlap in this wing-covert feature.

The measurements of the Point Length and Tip Length show that they are different between the two species (Figure 3). As an aside, if one conducts a statistical analysis comparing these numbers, they do show up to be significantly different statistically, which means that the observed difference is likely not due to chance alone. Note that the average point length of Bullock's Orioles is substantially greater than that of the Baltimore Oriole. The white tip of each covert (tip length) on the Baltimore Oriole is much more extensive than that of the Bullock's Oriole. The white tips of the median coverts will wear with time, but birds measured were from various times of the year. Again, while differences are clear, the overlap between these two measurements confirms that they are not diagnostic in separating these two species. Other analyses of the measurements show that the wing-covert pattern is much more variable in Baltimore Oriole than in Bullock's Orioles. This conclusion fits a general pattern of high variability of appearance in Baltimore Orioles, compared to Bullock's (Jaramillo and Burke 1999).

It is worth mentioning that juvenal and non-juvenal median coverts are different in their pattern. In general, the dark centers of juvenal coverts have a more rounded rather than a pointed shape. As well, the extent of the dark centers is much greater in juvenal coverts such that the white tip is restricted to more of a white fringe around the dark center. Thus, on juveniles the upper wingbar is narrower on average than in older stages. The pattern can be similar to that of older ages; for example, the center bird pictured on pages 292-293 in Lee and Birch (1998) is a juvenile showing a pattern not substantially different from that of an adult female Bullock's Oriole. It is not clear what the retention pattern (if any) is of juvenile coverts after the first prebasic molt.

The accompanying two photographs (Figure 5 and 6) of a banded Bullock's Oriole from coastal California show a median-covert pattern that fits the perfect description of the Baltimore-type pattern described by Lee and Birch (1998). The median coverts have a straight-cut white tip, and lack the serrated appearance more typical of Bullock's Oriole. This bird did not show any signs of being a hybrid, and was in its second calendar year of life based on differential wear of wing feathers, and can be used as a living example that this covert difference is average, but not absolute, between these two species.

In summary, the greater covert feature may be useful as a supporting character, but it is not diagnostic in making an identification. Thus, Lee and Birch's

Figure 6 ALVARO JARAMILLO

(1998) statement that "...this new wingbar field mark proved to be successful in identification to species of all ages and sexes" appears to be an overstatement. I studied only the median coverts, not the greater coverts which were included by Lee and Birch as part of their wingbar field mark. Nevertheless, even including the greater coverts, I don't feel that looking at coverts alone will allow for the identification of all individuals.

Acknowledgments

First, I thank Cin-Ty Lee and Andrew Birch for their original article, which inspired me to look more closely at oriole coverts. Thanks to Carla Cicero of the Museum of Vertebrate Zoology, Berkeley, for giving me access to work in the fine collection. Thanks to Peter Burke for suggestions and comments. The Bullock's Oriole pictured was banded under permit by the San Francisco Bay Bird Observatory.

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Jaramilllo, A., and P. Burke. 1999. *New World Blackbirds: The Icterids*. Princeton University Press.

Lee, C-T., and A. Birch. 1998. Field Identification of Female and Immature Bullock's and Baltimore Orioles. *Birding* XXX: 282-295.

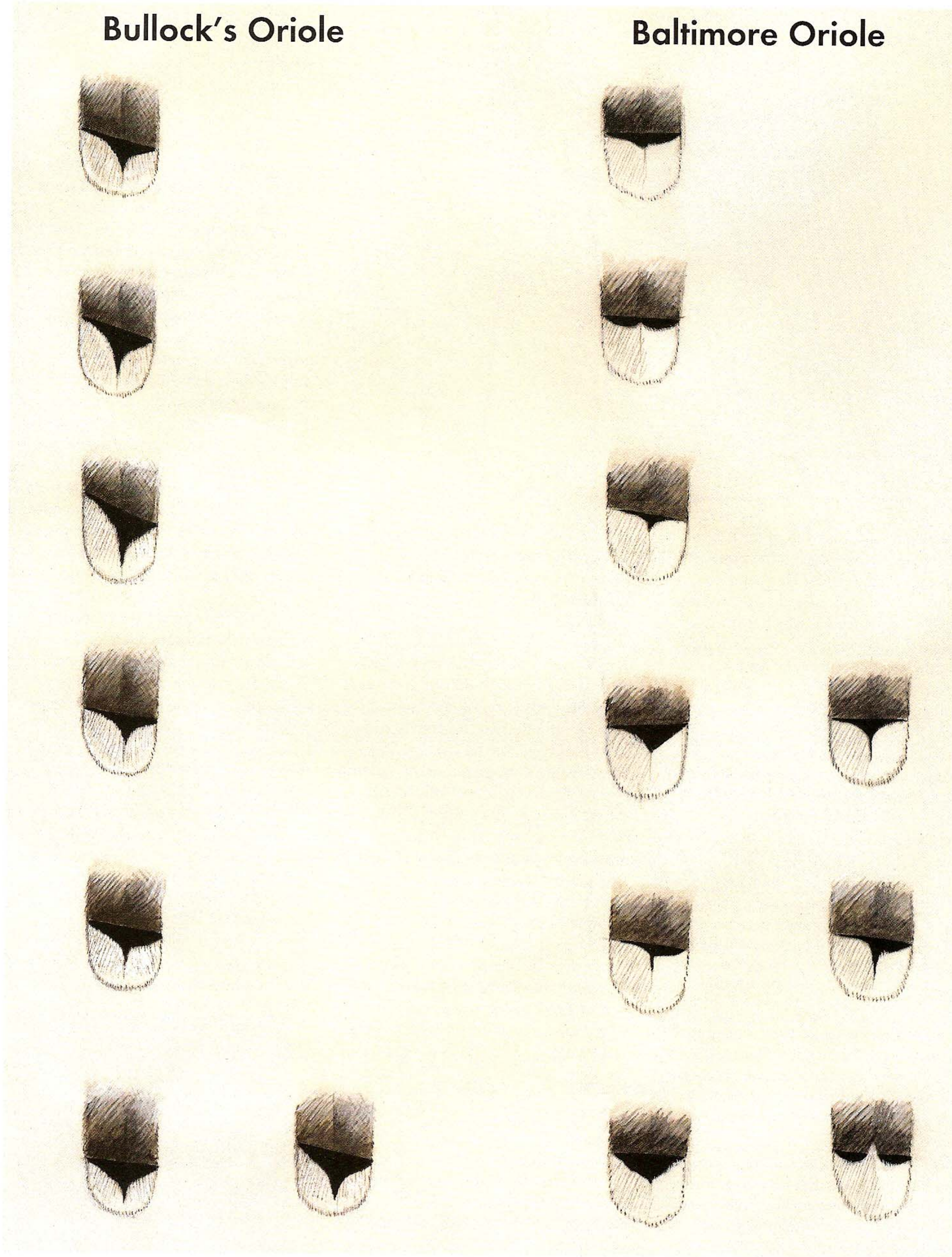
Alvaro Jaramillo
San Francisco Bay Bird Observatory
P.O. Box 247
Alviso, CA 95002

AJ had his guide, *The New World Blackbirds*, illustrated by Peter Burke, published by Princeton University Press, and he is currently working on a field guide to the birds of Chile.

Two years ago, we discussed this issue in much detail and demonstrated for the first time that wingbar pattern (in females and immatures) may be a diagnostic field mark when used in combination with other previously recognized field marks such as overall coloration, belly coloration, and facial pattern (Lee and Birch). To summarize briefly, we stated that the upper wingbar (median coverts) on Bullock's Orioles appeared serrated or undulatory, whereas that on Baltimore had a straight-edged appearance (Figure 1). We claimed that this feature could be seen in the field and is diagnostic.

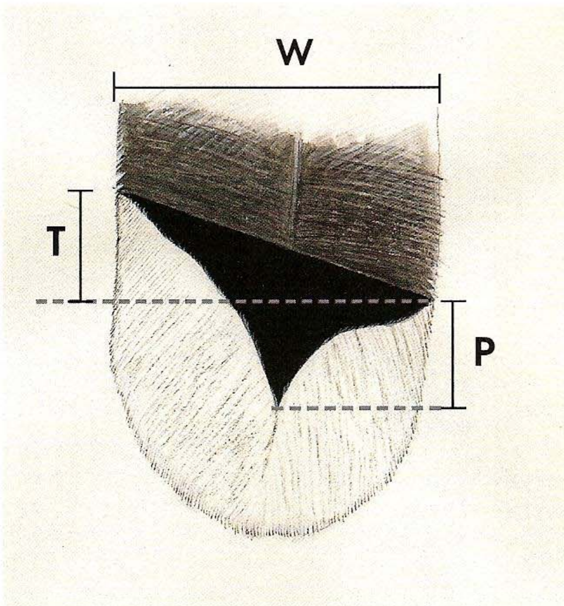
In his comments on our article, Alvaro Jaramillo (AJ) contests our findings, stating that wingbar pattern is not always diagnostic because of a complete overlap in the degree of indentation measured on a small number of specimens at the University of California, Berkeley collection. Moreover, he states that both he and artist Peter Burke were surprised that they had overlooked this wingbar feature during the preparation of their reference book on orioles and blackbirds of the Americas (1999). We first recognized the potential for this wingbar fieldmark in the field and in photographs, not in museum specimens. The question to ask is whether this field mark is as illusory as AJ's statements might lead readers to conclude. Although we thank AJ for bringing our attention to this issue, we do wish to contest his claims because we believe that they are based on flawed measurements. The source of this confusion, however, lies in us because we did not adequately clarify what we meant by the degree of indentation and therefore, we apologize for any oversimplification that we presented. The technical details are explained here.

In Figure 7, we have drawn the observed variation in median-covert patterns of female and immature Bullock's and Baltimore Orioles, arranged in the order of their frequency of occurrence. Clearly, there is much in-species variation, and, in particular, many of these patterns are asymmetric due to a tapering effect of the white feather edges on the anterior side of the feather. A qualitative observation is that Bullock's tends to have more asymmetric feather patterns than Baltimore, a feature that is consistent with the more "serrated" appearance of the former's upper wingbar. Given that asymmetry exists, how one measures the degree of indentation becomes especially critical. In Figure 8, we illustrate three absolute measurements that can be used to describe feather pattern. We define a parameter, p, which represents the fine



ANDREW BIRCH

Figure 7. Variation in the patterns of median covert feathers. Note the greater asymmetry in Bullock's Orioles.



ANDREW BIRCH

Figure 8.
Measurements of point length and taper. In order to account for the asymmetric feather pattern, the quantity t+p is the more relevant feature for field identification.

indentation measured from the base of the white feather edge on the posterior portion of the feather. This parameter, *p*, is identical to AJ's "point length." We also define a parameter, *t*, which is the distance that the white tip extends or *tapers* up the anterior part of the feather. A more accurate depiction of the degree of indentation is the quantity *t+p*, as it is this feature, rather than point length, that is readily recognizable in the field. In order to account for variations in the size of feathers, we normalized the quantities, *t+p*, to the width of the feather.

We measured the above parameters on the fourth or fifth median covert (from the inside) on 45 and 65 Bullock's and Baltimore Orioles, respectively, at the Harvard University Museum of Comparative Zoology. Like AJ's approach, we used dial calipers, accurate to within a tenth of a millimeter, and measured only immatures, females, and immature males. Our measurements of point length, *p*, for Bullock's and Baltimore Orioles are 2.0 6 0.8 mm and 0.9 6 1.0 mm, respectively (errors are 1 standard deviation). This is identical to within error of AJ's estimates for point length using an independent data set (0.9 and 1.8), thus demonstrating that this measurement can be made with minimal observer bias. Importantly, our findings are consistent with AJ's results, which indicate that the two oriole species display statistically significant differences in point length, but also display considerable overlap. We thus agree with AJ's assertion that point length by itself should be used only as an aid toward identification.

However, it is unlikely that point length is the best measurement to make because this feature is difficult to observe in the field. As discussed above, a more useful measurement is the sum of the point length and the taper length, *t+p*. This quantity is a measure of the amount of black feathering versus white feathering on a median-covert feather. The average of this quantity for Bullock's Oriole is 7.1 6 2.0 mm and for Baltimore Oriole is 2.0 6 1.0 mm. This difference is illustrated in Figure 9, where we have normalized our measurements to the width of the feather (t+p/w) in order to account for intrinsic (within species) variation in the size of the median covert feathers. By normalizing, we can compare our measurements with measurements taken from photographs. As can be seen, the two oriole species differ significantly in this feather parameter, and the overlap is small. Since this parameter is more likely to manifest itself as an observable feature in the field than the point length is, we conclude that the patterns of the median covert feathers on the two oriole species is indeed significantly different. This should not come as much of a surprise because the feather patterns on Bullock's tends to be more asymmetric than on Baltimore, and the quantity *t+p* correlates with the degree of asymmetry.

AJ presented a photograph (Figure 5) of a female Bullock's Oriole in her second calendar year in order to illustrate the variability in point length. In fact, if one accounts for the taper length, the fifth median covert feather on the photographed oriole yields a *minimum* (t+p)/w of at least 0.7, assuming that the point length is zero and that a portion of the taper is hidden by the overlying feathers. Only 15 percent of Baltimores have values of (t+p)/w encompassing 0.7. This photograph is thus a living example of classic Bullock's Oriole. One cannot deny the "serrated" or undulatory appearance of the upper wingbar in the photograph of the bird with folded wings (Figure 5). Our proposed field mark—that Bullock's has a more "serrated" upper wingbar while Baltimore has a "straight-edged" upper wingbar—is thus valid. An important warning, however, is that immature and female Bullock's/Baltimore orioles should not be identified on the sole basis of one fieldmark. A number of factors can lead to apparent variability, as common sense dictates. For example, if the median coverts are closely spaced, then even Bullock's can have a "straight-edged" wingbar. We have also witnessed Baltimore Orioles with noticeable point lengths. However, in these individuals, the degree of taper is very small and therefore the overall effect is still to give a "straight-edged" appearance to the wingbar pattern. We also caution that while our proposed fieldmark may be diagnostic (in combination with other field marks), considerable experience with both species is needed to appreciate within-species variation.

On a final note, we also reexamined juvenile plumages at the urging of AJ. We found that the feather patterns on juveniles are extremely variable (see AJ's reply). Combined with the fact that both species in this stage are extensively washed with buffy or yellowish coloration on the underparts, identification to species in juvenile plumage may not be possible. However, of the museum specimens that we examined, juvenile plumages were confined to June and July. By August, immature Baltimore and Bullock's Orioles could be distinguished from juveniles on the basis of grayish bellies in the latter and more orangish coloration in the former. In addition, median coverts on both species appear to have been replaced to a certain extent

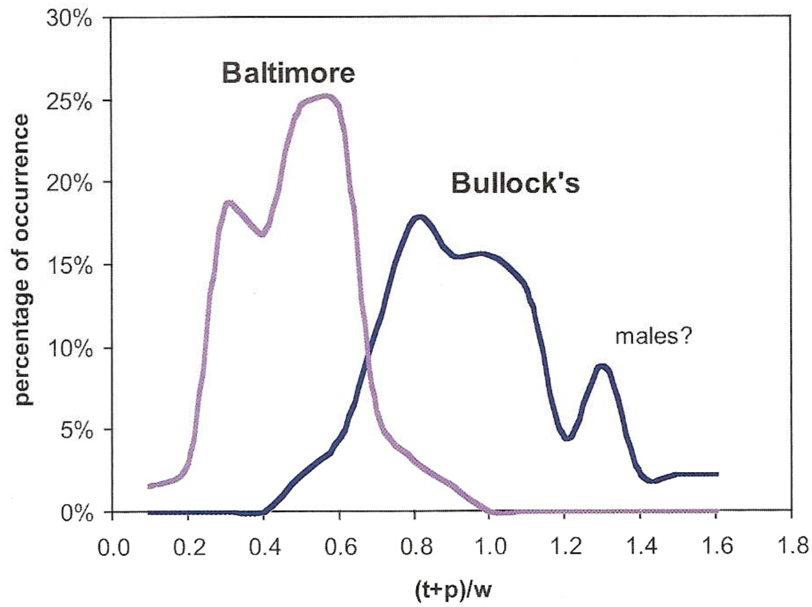


Figure 9.
Histogram of the quantity (t+p) normalized to the width of the feather. Hint of bimodal distribution within each species may be due to differences between male and female. In Bullock's, males tend to have higher (t+p)/w.

(although we were unable to determine beyond reasonable doubt the number of juvenile coverts that were retained). Given that Baltimores go through their prebasic molt on the nesting grounds and that Bullock's undergo prebasic molt during migration (Bullock's begins southward migration by early July, Lee and Birch, 1998), the problems with juvenile identification are probably not significant during fall or winter, when vagrants of these species are likely to be encountered.

Acknowledgments

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Cin-Ty Lee
Department of Earth and Planetary Sciences
Harvard University
20 Oxford St.
Cambridge, MA 02138
ctlee@fas.harvard.edu
C-TL is currently a PhD candidate in the Department of Earth and Planetary Sciences at Harvard University. His fieldwork is based in Tanzania, South Africa, and southwestern USA.

Andrew Birch
5709 Kester Ave., Apt. 3
Van Nuys, CA 91411
ABirch@dreamworks.com
A native of England, AB started birding and painting birds by the time he was eight years old. He moved to the US in his early 20s.