OSTRICH 2009, 80(2): 109–110
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OSTRICH
ISSN 0030–6525 EISSN 1727–947X
doi: 10.2989/OSTRICH.2009.80.2.8.835

Short Note

Can eyeflecks be used to sex African Black Oystercatchers *Haematopus moquini* in the field?

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Morphometric differences between males and females are a common feature among oystercatcher species (Hockey 1996), although breeding partners often appear similar when observed from a distance. Combinations of different biometric parameters such as bill size and shape, body mass, wing and tarsus lengths have been used to discriminate males and females in the field in European Oystercatchers *Haematopus ostralegus* (Zwarts et al. 1996), American Black Oystercatchers *Haematopus bachmani* (Guzzetti et al. 2008) and the three oystercatcher species present in New Zealand (Baker 1973). Sexual dimorphism also occurs in the African Black Oystercatcher *Haematopus moquini*, an endemic species living on the coasts of Namibia and South Africa. In this species, females tend to have longer and sharper bills than males (Hockey 1981, Hockey 2005). However, sex determination based solely on this parameter can be inaccurate because the ranges of bill size between males and females overlap. Variations in bill morphology between sites and/or regions may also occur in relation to feeding habits and prey assemblages (Hulscher 1996). Another way to sex oystercatchers is checking for cloacal distension in females during the period immediately after egg laying. Although molecular markers remain the most reliable tool for sexing non-ratite birds (Fridolfsson and Ellegren 1999), these techniques require capturing the birds, are relatively expensive and the results are not immediately available. A new field sexing technique for American Black Oystercatchers is based on the presence or absence of a black spot below the iris (Guzzetti et al. 2008). In this note, we investigated the potential use of this technique to sex African Black Oystercatchers in the field. Bill lengths and eyeflecks were used as discriminant factors to sex breeding individuals and we compared the accuracy of this technique with molecular sexing.

We captured breeding oystercatchers and chicks between December 2007 and February 2008 using walk-in traps on nests. Bill, wing, and tarsus lengths of adults were measured to the nearest 0.1 mm and birds were weighed to the nearest 1 g. As chicks were still growing, their biometric parameters were irrelevant for the purpose of this note. In addition, a high-resolution headshot of every bird was taken with a digital camera. A few drops of blood were drawn from the tarsus vein for molecular sexing based on size differences between the CHD1W and CHD1Z introns located on the sex chromosomes (Fridolfsson and Ellegren 1999).

A total of 34 breeding adults was captured, of which 17 were identified as female and 17 as male by molecular sexing. Twenty-nine chicks were caught by hand: 17 were later identified as females and 12 as males. Adult females had significantly longer bills than adult males (Student's *t*-test $P < 0.001$) with bill lengths ranging from 64.0 to 80.8 mm (mean 72.7 ± 3.8 mm) and 61.4 to 70.1 mm (65.2 ± 2.4 mm) for females and males, respectively (Figure 1). To test the accuracy of using bill length to discriminate between sexes, we assigned any bird with bill length >68.0 mm as female and <68.0 mm as male, 68.0 mm being the median of the bill length distribution. Using this technique, two females (bill length = 64.0 mm and 67.2 mm) were mistaken for males and two males (bill length = 68.2 mm and 70.1 mm) were incorrectly identified as females (Figure 1). In order to test the accuracy of eyeflecks in identifying males and females, we categorised eyeflecks as described in Guzzetti et al. (2008): a = no eyefleck, b = slight eyefleck and c = eyefleck (Figure 2). The following hypothesis was used: males have

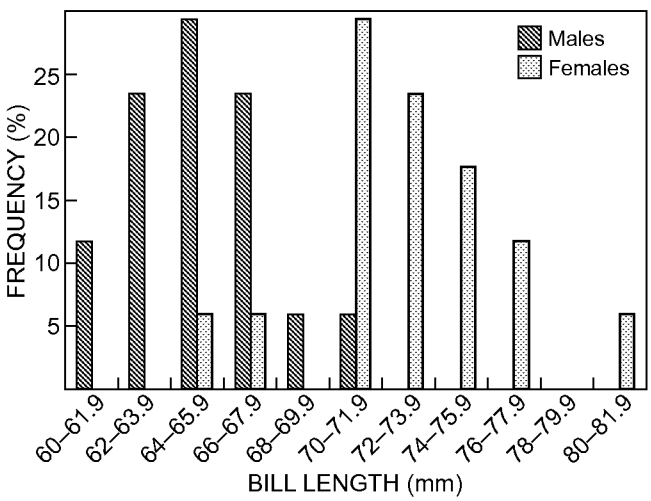

Figure 1: Distribution of bill sizes in males and females of adult African Black Oystercatchers

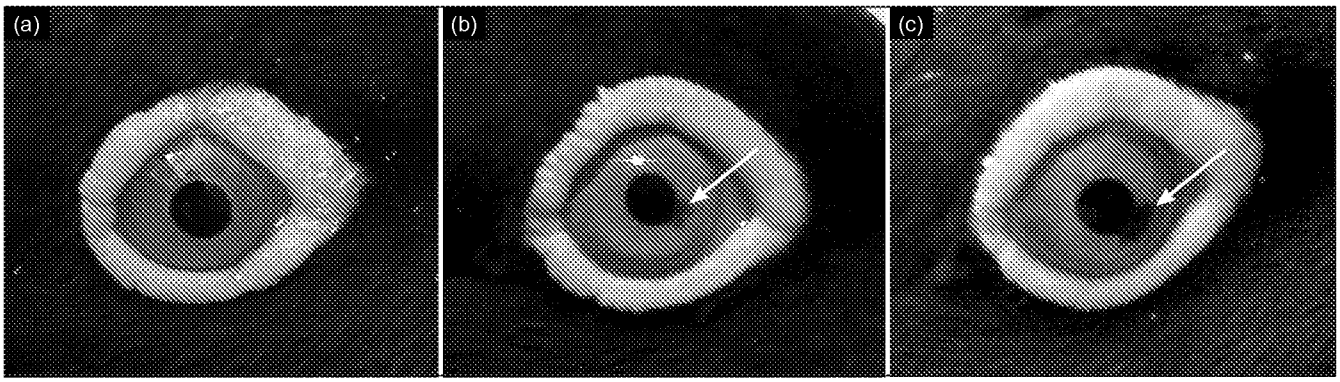

Figure 2: Categories of eyeflecks. (a) No eyefleck, (b) slight eyefleck and (c) eyefleck. When present, eyeflecks are indicated with a white arrow

no (Figure 2a) or slight eyeflecks (Figure 2b) and females have clear eyeflecks (Figure 2c). Out of 34 birds, only one female was misidentified as a male, based solely on this criterion (Figure 3) and no males were misidentified as females. No eyefleck was observed in any of the 29 chicks.

During bird sampling conducted between December 2007 and February 2008, we used bill length and eyeflecks to distinguish adult males from adult females after capture. A combination of these two factors allowed us accurately to sex each of the 34 sampled birds, as was later confirmed by molecular sexing. Except for one female with a slight eyefleck and a bill length of 70.4 mm, the absence or presence and intensity of eyeflecks in African Black Oystercatchers was a more reliable determinant of sex than bill length. Other morphometric factors, such as tarsus length and body mass, did not show any significant sex-related differences, although females displayed higher mean values for these parameters, as previously described in Hockey (1981). Using the same discriminating method as for bill length, sex determination using body mass and tarsus length were inaccurate for 32.4% and 41.2% of adults, respectively. Females had significantly longer wings (270.6 ± 7.7 mm) than males (266.1 ± 7.2 mm), but this was also a poor determinant of sex as 26.5% of adults were wrongly sexed based on this criterion.

Eyeflecks have been observed in at least 10 of the 11 oystercatcher species (Guzzetti et al. 2008), yet no explanation on the origin of these dark regions has been found. Hypotheses linking diet preferences, carotenoid allocation and health to eyeflecks have been proposed (B Guzzetti pers. comm.). Our conclusion is that eyeflecks are a reliable sex indicator for captured adult African Black Oystercatchers but not for chicks, thus sexing of juveniles in the field remains a problem. To increase the accuracy of sexing adults in the field, eyeflecks could be combined with other morphometric parameters, especially bill length. Finally, with proper optical equipment, using eyeflecks could provide a more objective method to assign sex from a distance than using other physical characteristics such as size and shape of bill.

Acknowledgements — We thank the Animal Demography Unit, Marine and Coastal Management, and Koeberg Nature Reserve for logistic support and access to sampling sites; Paul Martin, Audrey Valery and Carl Vernon for assistance in the field; Yves Cherel, Sébastien Jaquemet and Christopher McQuaid for comments on a draft; Peter Ryan and Les Underhill for reviewing the manuscript; and Brian Guzzetti for inspiring this note.

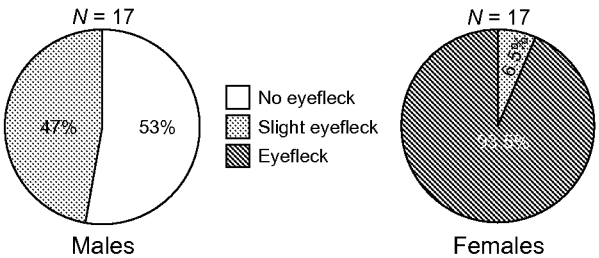

Figure 3: Proportions of eyefleck categories in males and females

References

Baker AJ. 1973. Criteria for aging and sexing New Zealand Oystercatchers. *New Zealand Journal of Marine and Freshwater Research* 8: 211–221.

Fridolfsson AK, Ellegren H. 1999. A simple and universal method for molecular sexing of non-ratite birds. *Journal of Avian Biology* 30: 116–121.

Guzzetti BM, Talbot SL, Tessler DF, Gill VA, Murphy EC. 2008. Secrets in the eyes of Black Oystercatchers: a new sexing technique. *Journal of Field Ornithology* 79: 215–223.

Hockey PAR. 1981. Morphometrics and sexing of the African Black Oystercatcher. *Ostrich* 52: 244–247.

Hockey PAR. 1996. *Haematopus ostralegus* in perspective: comparison with other oystercatchers. In: Goss-Custard JD (ed.), *The oystercatcher: from individuals to populations*. New York: Oxford University Press. pp 251–285.

Hockey PAR. 2005. African Black Oystercatcher. In: Hockey PAR, Dean WRJ, Ryan PG (eds), *Roberts birds of southern Africa* (7th edn). Cape Town: Trustees of the John Voelcker Bird Book Fund. pp 389–391.

Hulscher JB. 1996. Food and feeding behaviour. In: JD Goss-Custard (ed.), *The oystercatcher: from individuals to populations*. New York: Oxford University Press. pp 7–29.

Zwarts L, Hulscher JB, Koopman K, Zegers PM. 1996. Discriminating the sex of oystercatchers (*Haematopus ostralegus*). *Ardea* 84: 1–12.

Received December 2008, accepted March 2009
Editor: A Monadjem