Sexing and ageing Black-capped Chickadees (*Poecile atricapillus*): combining methods

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The objective of this study was to find reliable, year-round characteristics for ageing and sexing the eastern subspecies of Black-capped Chickadee, *Poecile atricapillus atricapillus*, for use in the field. Age and sex determination allows for advanced understanding in studies of social and flock organization, dominance hierarchy, breeding behaviour, visual displays, ecology and monitoring at the population or individual level.

Discriminant function analysis of tail length, wing length and weight was used to predict the sex of breeding and wintering eastern Black-capped Chickadees, in a manner similar to that described by Desrochers (1990) in which sex was correctly predicted for 92-95% of individuals in an Alberta population. Measurements on specimens from Ontario and Quebec in the Canadian Museum of Nature collection (n=35 males, 37 females) were used to build the discriminant function analysis in this study. Results from the analysis of 66 chickadees captured and measured at MBO also show that using these three characters in combination improved predictive ability over just using wing chord (or any other character alone), but with a lower level of success (79%) than the Alberta study. This may in part be a limitation related to sample size, as relatively few of the chickadees at MBO have had sex confirmed by brood patch or cloacal protuberance during the breeding season. As the sex of more banded individuals is confirmed, it may be possible to refine the results. The linear function obtained to best discriminate males and females is:

D= -42.591+0.460 (Wing)+ 0.279 (Weight) + 0.179 (Tail)

It has been suggested (Pyle 1997) that the colour of the roof of the mouth may vary with age, while Mosher and Lane (1972) indicated that the shape of the bib and cap may be of value in distinguishing between sexes. However, objective methods for consistently quantifying bib and cap shape have yet to be described, and based on study of known-sex birds at McGill Bird Observatory we believe that doing so may be difficult as these shapes vary considerably depending on the posture of the bird.

On the contrary, the appearance of an individual chickadee's upper mouth lining can be easily classified into one of four categories (Figure 1).

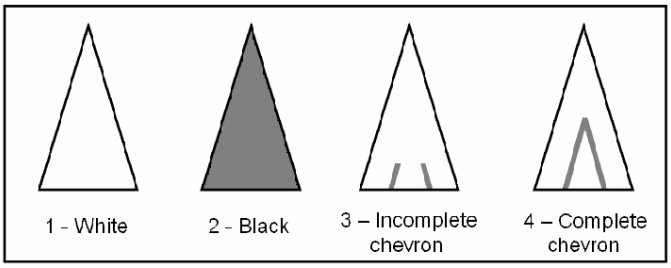

Figure 1. Scale of the lining of the roof of the mouth of Black-capped Chickadees.

Observations of 200 individuals (125 hatch-year, 75 after-hatch-year) involved very few individuals with the all dark pattern 2 (n=3), i.e. the vast majority of chickadees exhibit either an entirely white roof (n=117), a complete dark chevron (n=31), or an intermediate form with a partial chevron (n=49). (Figure 2)

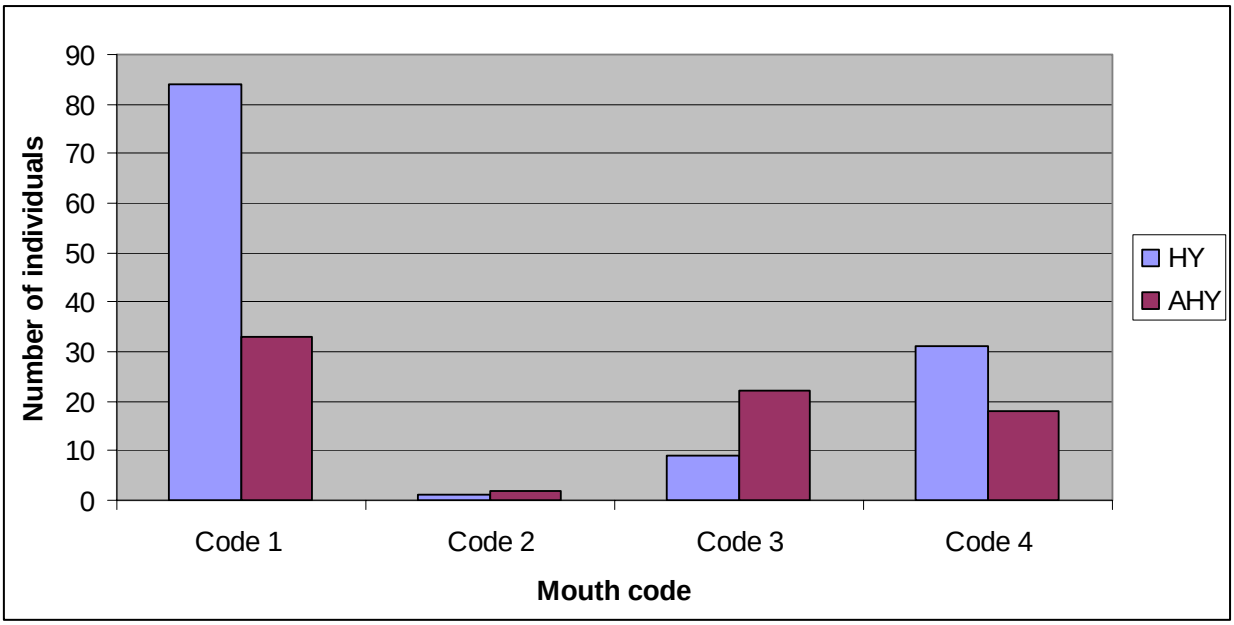

Figure 2. Number of HYs and AHYs assigned to each mouth code.

A correlation was seen between mouth colour and age, but the results were not reliable enough for this to be used alone as a criterion for ageing. Nearly 70% of first-year (HY/SY) birds had a white mouth lining, while 25% had a complete chevron. This suggests that the chevron marking may develop with age. Wetherbee (1961) noted that the completely white mouth lining of HY birds could act as a target for the parent's regurgitative feeding. Cavity-nesting birds, such as the Black-capped Chickadee, exhibit brighter mouth-colouration as an adaptation to poor visibility in the dark nest (Wetherbee 1961, Smith 1991). Hatch-year birds would gradually exhibit different mouth patterns as they grow and as they become independent of their parents.

However, over 40% of older (AHY/ASY) birds in this study also had a white mouth lining. If the chevron pattern does develop with age, perhaps there are other factors influencing its rate of development, such as age, breeding location, or environmental conditions. While some rate of error in determining sex of individuals is likely, this cannot account for the apparent contradiction in results. Nonetheless, as the number of recaptures of known-age chickadees at

MBO increases, it will be worthwhile to reassess the data using those birds only. This will also make it possible to identify whether individuals do change mouth colour over time, as suggested by the pattern in Figure 3, and if so, whether this occurs at a predictable age and/or time of year.

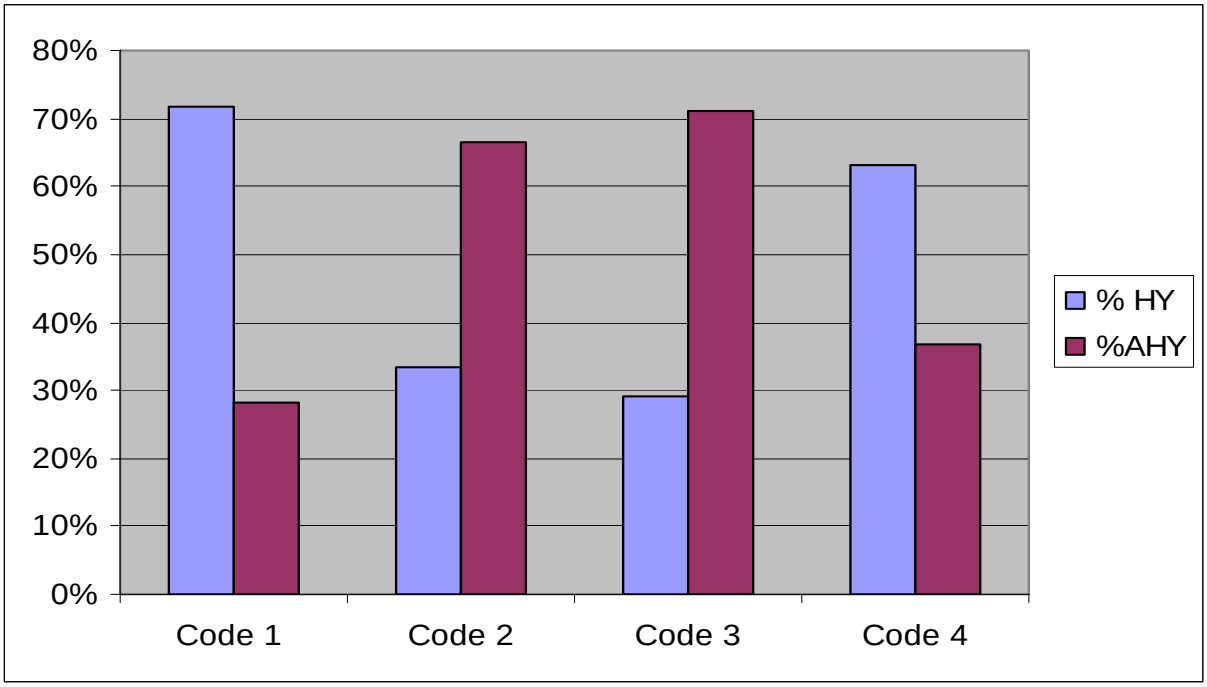

Figure 3. Proportion of HY and AHY assigned to each mouth code.

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Contributions of authors: *LAR compiled the data, executed the discriminant function analysis, and prepared the text of this report. MAG and MAH shared primary responsibility for banding, ageing, and sexing of chickadees, developed the mouth coding system, and provided advice and editorial assistance; MAH additionally measured the reference specimens at the Canadian Museum of Nature*

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