

A METHOD FOR SEXING ADULT RINGED PLOVERS  
Charadrius hiaticula L., in Summer Plumage

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Whilst undertaking a taxonomic study of the Ringed Plover Charadrius hiaticula using museum specimens, I have found that adult males and females in summer plumage show slight differences in the pectoral band.

It is known that in winter plumage, adult males and females can be differentiated in the hand. The "Handbook" states that in females there is a variable number of brown feathers intermixed with the black feathers that form the distinctive bands on the head and the pectoral band of this species. In males there are only very rarely any brown feathers present. According to the literature the sexes cannot be separated on any plumage characteristics when in summer plumage.

A large series of birds in summer plumage was assembled from museums throughout the world. It became apparent whilst studying these specimens that many of the summer females showed varying amounts of brown feathers in the black pectoral band and it was decided to quantify these subjective observations in an attempt to find a criterion for sexing adult birds in the band.

One hundred and eighteen sexed adult birds, that had been collected between April and September, mostly from western Europe but a few from Greenland and Siberia, were examined closely for the absence or presence of brown and black feathers in the pectoral band. It was noted that most of the brown feathers were situated in the side regions of the band; adjacent to, and sometimes partly covered by, the folded wing. The feathers in this region were counted by gently depressing the plumage along the anterior edge of the pectoral band and drawing a seeker gently across the band to the posterior edge. As the seeker passes the tip of each feather along the depressed line, the feathers spring up one at a time and, under good illumination, can be counted individually.

In this manner sixty eight adult males and fifty adult females were examined. The feathers counted were divided into two categories, brown or black. The percentage of brown feathers present was calculated for each group of birds for each month studied and the percentage of birds with black feathers only, brown feathers only or a mixture of the two types was also calculated. The results are shown in Table I and in Figure I.

Male

Month	Apr	May	Jun	Jul	Aug	Sep
Mean %	12.3	1.7	0.8	1.6	6.1	3.1
S.D.	22.3	3.3	2.4	3.9	16.0	8.1
n	16	12	10	10	13	7

Female

Month	Apr	May	Jun	Jul	Aug	Sep
Mean %	13.5	40.4	24.0	26.5	44.4	75.5
S.D.	17.9	28.1	20.7	20.2	29.8	22.1
n	9	10	10	10	7	4
t	0.11	3.94	3.17	3.27	2.44	5.14

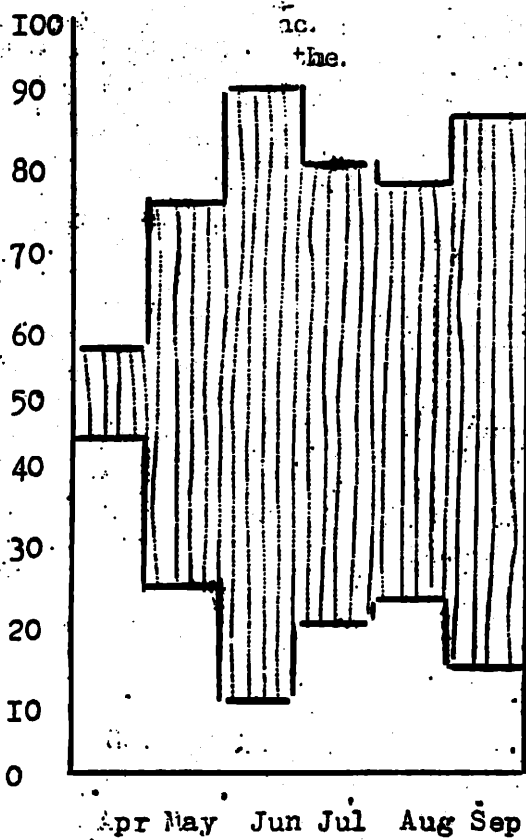
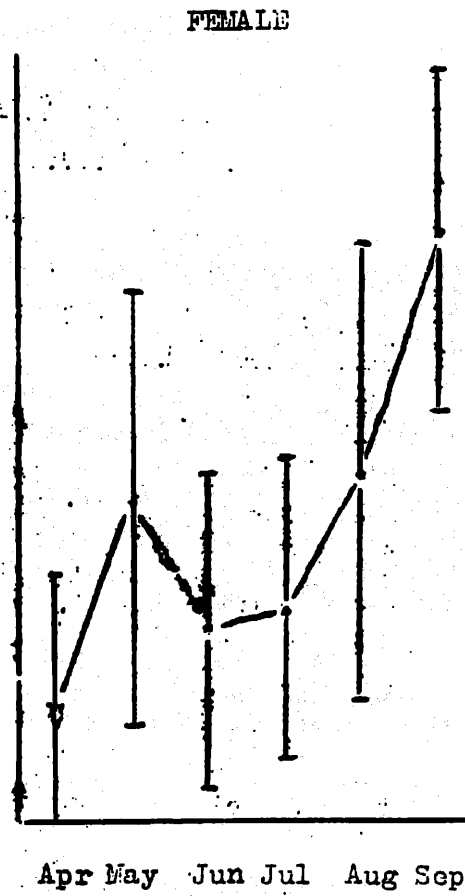
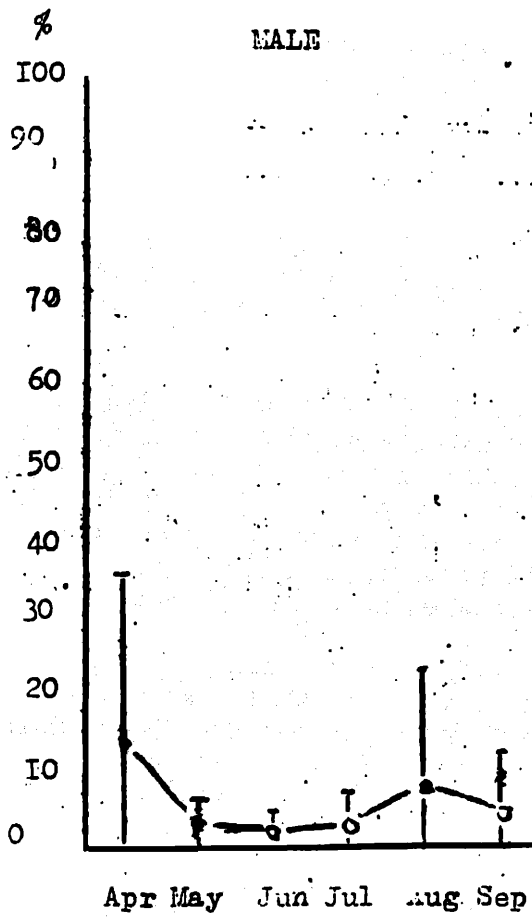


Figure I. Upper left and right - percentage of brown feathers in the pectoral band of Ringed Plover; plus one standard deviation either side of the mean. Bottom left and right - percentage of birds with all black feathers, vertical hatching; all brown feathers, horizontal hatching; brown and black feathers mixed, no hatching.

TABLE I The percentage of brown feathers in the pectoral band of Ringed Plover. S.D. is one standard deviation from the mean, t is the results of Students' t test comparing the means of males and females from the same month - no notation above t means that the means are not statistically significant; ' = significant  $P=0.5 - 0.1$ ; '' =  $P 0.01 - 0.001$ ; ''' =  $P 0.001$ .

Figure I Upper left and right - percentage of brown feathers in the pectoral band of Ringed Plover; plus one standard deviation either side of the mean. Bottom left and right - percentage of birds with all black feathers, vertical hatching; all brown feathers, horizontal hatching; brown and black feathers mixed, no hatching.

It can be seen that in all months excepting April, the females contain a much higher percentage of brown feathers in the side region of the pectoral band than do the males; these differences are statistically significant (see Table I, t tests). The only month where a large difference does not exist between males and females is April. I consider that this is probably due to the presence of some first year birds in the male sample retaining a few brown juvenile breast feathers through the post-juvenile moult. One of the birds in this group was positively identified as a first year bird by the incomplete ossification of the skull. The retention of a few juvenile feathers in the body plumage is by no means exceptional and has been observed in 19.5% of one hundred and twenty three first winter Purple Sandpipers *Calidris maritima* examined. (Taylor, unpublished data). Three females with all black pectoral bands in April are difficult to explain. It may be that these birds have been incorrectly sexed by their collectors - this would not be too unlikely since it has been estimated that up to ten per cent of birds are incorrectly sexed in the field when time is at a premium.

The appearance of brown feathers in 19.2% of males collected between May and September, and the lack of any brown feathers in 7.3% of females collected in the same period suggests that it is not a straightforward "all black or all brown" situation.

The conclusions that may be drawn from this limited study are that birds caught in April containing brown feathers in the side region of the pectoral band could be either males or females, but are more likely to be females. However those birds with brown feathers caught in May to September will almost certainly be females and those with all black feathers males. A larger series of birds would clarify the situation further, but for practical purposes it should be possible to sex correctly about 85% of adult birds caught between May and September using the criterion described above.

#### Summary:

April	-	Feathers all black	male or female
		Feathers black and brown	male or female
		Feathers all brown	female
May	-	Feathers all black	80% male
Sept.	-	Feathers black and brown	90% female
		Feathers all brown	female