SPRING MEASUREMENTS, WEIGHTS AND PLUMAGE STATUS OF *CALIDRIS RUFICOLLIS* AND *C. FERRUGINEA* IN HONG KONG

by David S. Melville

Introduction

The Red-necked Stint Calidris ruficollis and the Curlew Sandpiper C.ferruginea are passage migrants in Hong Kong. Although Webster (1975) states that the Red-necked Stint is "recorded in all months of the year", in the period 1958-1974 there were only two records in June and none in July. Small numbers overwinter in Hong Kong and the spring passage which starts in early/mid April, usually ends in the third week of May, while the autumn passage appears to be variable with a few birds returning in early August, but most arriving in September/October (Hong Kong Bird Watching Society records). Extreme dates for the Curlew Sandpiper are 24 March to 31 May, and 7 July to 14 November (Webster 1975).

There is increasing evidence that at least some of the Curlew Sandpipers which pass through Hong Kong in spring have "wintered" in Australia:-

Ringed 29 January 1977 Kooragang Island, New South Wales, Australia (32°56'S 151°47'E)
Recovered 14 May 1978 Huangp'u Commune, Zhongshan County, Guangdong Province, China (22°31'N 113°22'E) (Anon 1978).
Ringed 24 March 1979 Werribee, Victoria, Australia (38°03'S 144°32'E)
Controlled 11 April 1980 San Tin, Hong Kong (22°30'N 114°04'E).
Ringed 31 January 1980 Werribee, Victoria Australia
Recovered 12 May 1980 Ning-bo, Zhejiang Province, China. (29°54'N 121°33'E).

A bird dyed with picric acid by the Victorian Wader Study Group winter 1979/80 (probably of this species) seen at San Tin, Hong Kong on 27 April 1980 (M.A. Webster).

The origin of Red-necked Stints is less certain as there has been only one control so far:-

Ringed 12 May 1980 San Tin, Hong Kong
Controlled 22 November 1980 Pipeclay Lagoon, Tasmania, Australia (42°58'S 147°32'E)

Methods

Waders were caught using single panel mist nets in the springs of 1977-1980 in the Mai Po/San Tin area, in the north-western part of the New Territories, Hong Kong (c22°31'N 114°04'E). Most birds were caught in 1979 and 1980 when conditions were particularly suitable at San Tin - about 60ha of damp mud/shallow water attracted up to about 4000 waders, most of which appeared to be feeding on Chironomid larvae and small gastropods (Melville 1980). Bill (exposed culmen), wing (maximum chord) and tarsus measurements were taken to the nearest 0.5 mm, and weights to the nearest 0.5 g. Categories of breeding plumage were subjective as I was unable to compare birds with standard skins or photographs. Weights and wing measurements were taken of all birds, but tarsus and bill measurements and plumage status were not recorded in all cases - hence the difference in sample sizes. All birds had fresh primaries and were considered to be adults unless indicated otherwise.

Results

Red-necked Stint

When wing, bill and tarsus measurements were examined there was no evidence of bimodality and they are presented as means $\pm$ standard deviation in Table 1. Thomas & Dartnall (1970b) give bill measurements of 17.5 $\pm$ 0.2 for males (n=31) and 18.6 $\pm$ 0.25 for females (n=50), the difference being significant at the 95% level but not at the 98% level, there being a large overlap. The wing measurements are somewhat longer than those given by Dement'ev & Gladkov (1969) - 27 males: $\bar{x}$ 99.4, range 96 - 106; 22 females: $\bar{x}$ 100, range 97 -107 - and those given by Prater et al. (1977) - 21 adult males: $\bar{x}$ 102.5, 96 - 108; 25 adult females: $\bar{x}$ 105.2, 96 - 111. Although both of these sets of data were obtained from museum skins, shrinkage of wing length should be less than 1 mm (Fig. 9 in Prater et al. 1977). Dement'ev & Gladkov (1969) apparently did not measure the flattened, straightened wing. The range of tarsus measurements is the same as that given by Thomas & Dartnall (1971a).

The wing/tarsus ratio ranged from 4.86 to 5.88, with a mean of 5.29 (n=44); four birds (9.1%) had a ratio of 5.0 or less, and one (2.3%) between 5.0 and 5.1. Prater et al. (1977) note that a ratio of 5.1 or above indicates Red-necked Stint and a ratio of 5.0 or below indicates Little Stint Calidris minuta, but that 2-5% of Red-necked Stints are in the overlap zone. Dement'ev & Gladkov (1969) give the ratios as 5-5.3 for Red-necked Stint, and 4-4.8 for Little Stint.

Weight data are shown in Fig. 1 which demonstrates an increase in mean weights between early April and mid-May (the only retrap lost 1 g between 11 and 15 April). The mean weights for early April in Hong Kong (25.1 g 4/5 April; 26.1 g 11 April; 26.6 g 15 April) are below the mean weight of birds 'wintering' in Tasmania (30.7 g, n=87, September - March) given by Thomas & Dartnall (1970a), corrected by Paton & Wykes (1978, p.60). Paton & Wykes (1978, Fig. 2) also recorded mean winter weights of about 30 g in Victoria. In the inner Gulf of Siam, Thailand weights appear to be lower with a mean of 25.6 g for the period October - February (n=52, range 20.5-30.25, Melville unpublished). There is little other published data on weights of Red-necked Stints. Dement'ev & Gladkov (1969) give the weight of 16 "old" males as 23.5-28 g, mean 25.7 g, and of 36 females 22.1-31 g, mean 26.6 g. Baker (1948) notes that one female collected on 20 October on Rota, Micronesia weighed 24.5 g. Weights of 45 birds caught in autumn 1979 in Chiba Prefecture, Japan averaged 32.3 g $\pm$ S.D. 5.8 g, with a range of 23.2-46.0 g (Anon 1980).

The lightest Hong Kong bird (20.5 g) is 5.5 g (21%) lighter than the lightest Tasmanian bird (Thomas & Dartnall 1971b). Three Red-necked Stints were collected in Hong Kong: one weighing 42 g had a fat score of 4 (after McNeil 1969), one weighing 34 g scored nearly 3, and one weighing 28 g scored 2-3. [One bird collected in central Thailand weighing 24.5 g scored 1.] Thomas & Dartnall (1970b) found that most birds wintering in Tasmania retained some subcutaneous fat, fat weight accounting for between 7.3 and 15.5% of total body weight (total body weight range 28-32.5 g, n=10). Although they noted that their method of fat extraction probably did not give absolute results, these data suggest that some of the lightest birds in Hong Kong may have expended all of their fat reserves, and possibly utilised protein reserves during their migratory flight.

Most Red-necked Stints passing chrough Hong Kong in spring have fresh, unworn primaries and show some stage of breeding plumage (Table 2). Three birds which were recorded with slight-moderate primary wear were probably adults

TABLE 1. Means, standard deviations and ranges of measurements of Calidris ruficollis in Hong Kong.

Wing length	$\bar{x}$	105.6 ± 2.71; n=148; range 97-116
Bill length	$\bar{X}$	18.0 ± 0.93; n=126; range 16-21
Tarsus length	$\bar{X}$	19.9 ± 0.75; n= 44; range 18-21

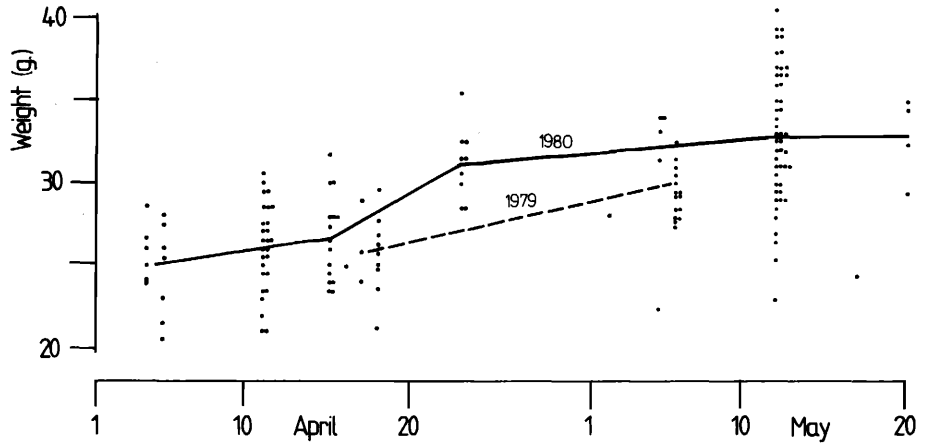


Figure 1. Weights of Calidris ruficollis in Hong Kong. Dots indicate individual birds; lines join mean values for years indicated.

TABLE 2. Plumage status of Calidris ruficollis in Hong Kong*

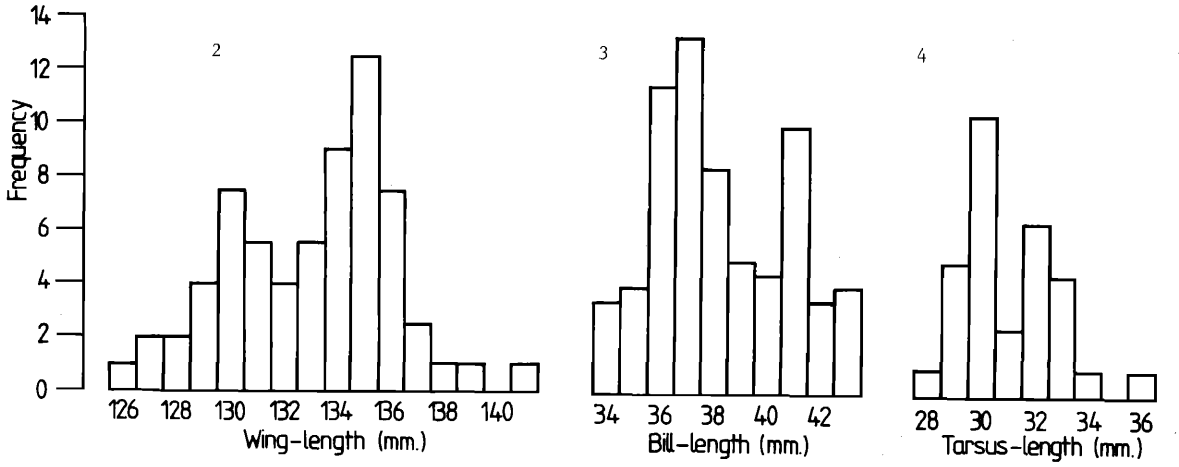
Date	None	Trace	i	1/4	1/3	i	1/2	i	2/3	i	3/4	Full
		Quantity of breeding plumage present										
4/5 Apr		1		4	2		5		1			
11 Apr		3		9	6		3		3		1	1
15/16 Apr	1				3		5		1		4	
17/18 Apr	1			3			4				1	1
23 Apr		2			2		1		1		2	
2 May							1					
5/6 May				4	1		5		2		5	
12/13 May		1	2	7	8	5	9	3	2	2	3	2
20 May		2					2					

Age uncertain (see text)

11 April moderately worn primaries, None
15 April worn primaries, Trace
23 April worn primaries, None

* Data for 1977-1980 combined

i Intermediate categories



Figures 2, 3, 4. Wing-lengths, bill-lengths and tarsus lengths of Calidris ferruginea in Hong Kong.

TABLE 3. Measurements of Calidris ferruginea

		Tasmania	South Africa	
		Thomas & Dartnall	Elliott et al.	Prater et al.
		1970b	1976	1977
Wing	m	118-135 ($\bar{x}$ 126.5)	121-135 ($\bar{x}$ 129.9)	125-136 ($\bar{x}$ 131.0)
	f	124-135 ($\bar{x}$ 129.8)	123-139 ($\bar{x}$ 131.1)	125-136 ($\bar{x}$ 131.1)
Bill	m	31.5-40.0 ($\bar{x}$ 35.6)	32-42 ($\bar{x}$ 36.8)	33-39 ($\bar{x}$ 36.0)
	f	35.5-43.5 ($\bar{x}$ 39.5)	36-45 ($\bar{x}$ 40.9)	35-42 ($\bar{x}$ 39.4)
Tarsus	m	26-30 ($\bar{x}$ 28.4)		27-32 ($\bar{x}$ 29.3)
	f	27.5-33 ($\bar{x}$ 29.8)		29-31 ($\bar{x}$ 29.7)

which had moulted August-December and possibly wintered north of the equator (Prater et al. 1977), rather than first summer birds, since many of these appear to remain in the wintering area (e.g. Thomas 1968, 1970, Paton & Wykes 1978). At Hobart, Thomas (1968) noted that in spring "The majority left without attaining full nuptial dress, although many individuals were considerably darker and more distinct (sic) marked on the crown and back and some showed a faint rufous wash on the throat". Dement'ev & Gladkov (1969) give no details of plumage status of spring migrants in the U.S.S.R., but Allen (1905) reported 25 specimens in breeding dress collected 28 May (when the first birds arrived) - 16 July, in northeast Siberia.

Curlew Sandpiper

Wing, bill and tarsus measurements are shown in Figs. 2-4 and suggest possible bimodality - sexual dimorphism has previously been reported for this species. Measurements of the Hong Kong birds are generally somewhat larger than those from Tasmania and South Africa (Table 3).

Weight data are shown in Fig. 5 (line joins mean values), which demonstrates an increase in mean weights from mid-April to early May. 'Winter' weights in Tasmania are about 57 g for males and 60 g for females (Thomas & Dartnall 1971c), which are heavier than those given by Dean (1977) for birds wintering at Barberspan, South Africa (October -February 46.2 - 49.9 g, both sexes combined), and slightly heavier than birds wintering at Langebaan, South Africa (Elliott et al. 1976). A sample of 46 birds from the inner Gulf of Siam, Thailand (October-February) had a mean weight of 55.6 g (range 46-63.5 g, Melville unpublished). The heaviest Hong Kong bird weighed 70.5 g, while the heaviest Tasmanian birds in March weighed 78 g (male) and 81 g (female). The mean weight increase in Hong Kong (o.36 g/day) is lower than in South Africa, where Elliott et al. (1976) recorded mean increases of up to 0.73 g/day in the first fortnight in April, and far lower than the 2-4 g/day recorded for birds in autumn in Britain (Stanley & Minton 1972), but is similar to that (o.3 g/day) recorded in north-west Africa in autumn (Wilson et al. 1980).

Moult data are given in Table 4. The majority of birds had fresh primaries, but two were in active primary moult, three showed a contrast of old inner primaries and new outer ones, and in one bird all of the primaries were very worn. Moult patterns of both adults and first winter birds are complex, but since virtually all first summer birds remain south of the breeding area (Prater et al. 1977), and the species is not recorded summering in China (LaTouche 1931-1934, Cheng 1976), it is assumed that these birds were adults. In Tasmania Thomas (1968) noted that "The first traces of breeding plumage were noted towards the end of January.....on the early date of January 30, 1965, one bird was in full breeding plumage.....but the majority left before they had assumed nuptial dress. Even in early April some still retained eclipse plumage, but these departed in the course of the next few days".

Discussion

The results presented here suggest that Hong Kong (and presumably elsewhere on the South China coast) is used as a "refuelling" stop in spring by both Red-necked Stints and Curlew Sandpipers travelling from Australian wintering grounds to breeding grounds presumably in Siberia. Lack of retrap data does not allow an estimate of the stop-over time of birds but casual field observations suggest that both species remain for a little more than one week before moving on*. Most birds in spring feed voraciously and it is likely that individual weight gains are considerably greater than the increase shown by mean weights. Thomas & Dartnall (1971c) suggest that Curlew Sandpipers migrating from Tasmania to Siberia would need one refuelling stop-over and that sufficient fat reserves for onward migration could be accumulated in ten days. However Stanley & Minton (1972) and Elliott et al. (1976) consider that Curlew Sandpipers have an average migratory range of about 3000 km, with heavier birds possibly being able to fly up to 5000 km. The distance from Werribee, Victoria to Hong Kong is 7200 km, it thus seems probable that birds travelling this route have made one stop-over before reaching Hong Kong.

Hong Kong's wetland area is rapidly diminishing as fish ponds (many illegal) replace intertidal flats and dwarf mangrove, and deep fish ponds and reclamation for construction take over former shallow shrimp ponds. Similar habitat destruction is taking place immediately across the border in Guangdong Province (pers. obs.) and Chinese scientists are now expressing concern about mangrove destruction in southern China (e.g. Wang 1980, Ho Shao-ye pers. comm.). If southern China is an important feeding area for migrating waders, as this study suggests, it is to be hoped that the Chinese authorities will take steps to ensure the continued existence of suitable habitats for these birds. In this context, China's recent interest in the I.W.R.B. is encouraging.

*Footnote

No systematic wader counts have been undertaken in spring in Hong Kong. The only records of spring departures of waders (pers. obs.) are:-

5 May 1976 small groups of Red-necked Stints and other waders moved off N from Mai Po at 1900 h.
4 May 1980 one group of c60 Curlew Sandpipers moved off ENE from San Tin and climbed out of sight 1130 h.
28 May 1980 c80 Red-necked Stints moved off N from San Tin in small groups 1900-1930 h.

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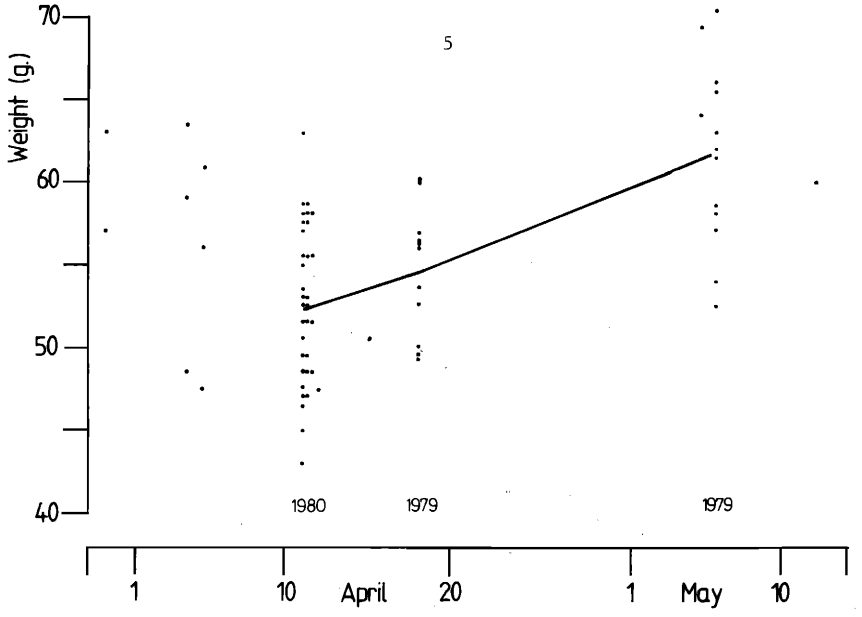

Figure 5. Weights of Calidris ferruginea in Hong Kong. Line joins means for periods.

TABLE 4. Plumage status of Calidris ferruginea in Hong Kong*

	Quantity of breeding plumage present								
Date	None	Trace	i	1/4	1/3	1/2	2/3	3/4	Full
4/5 Apr				1		1	1	2	
11/12 Apr	3	5	1	4	6	3	5	5	
15 Apr					1				
18 Apr	1	1		4		3		1	
5/6 May				2	1	2		3	1
12 May									1

Age uncertain

30 March contrast old inner, new outer primaries, None
4 April outer primaries new, None
11 April 55555 pale, 54200 active primary moult (The inner 5 primaries were clearly rather older than the sixth and the growing feathers)
11 April all primaries very worn, None
18 April 5555555553 active primary moult, plumage status not recorded
5 May outer 3 primaries new, ½
6 May contrast old inner, new outer primaries, ½
6 May contrast old inner, new outer primaries, ½

* Data for all years combined
i Intermediate category

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