dates at precisely the same African location to bait fish in a similar manner to the Black Kite that is the subject of the above note. A case of apparent baiting with insects by a Squacco Heron *Ardeola ralloides* had been reported.

I am very grateful to Mr Jeffery Boswall for his extensive assistance in revising this note.

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MOULT OF JUVENILE CURLEW SANDPIPERS IN SOUTHERN AUSTRALIA

Curlew Sandpipers *Calidris ferruginea* breed in the palaearctic (Vaurie 1965) and migrate to South Africa, Australia and New Zealand, where adults undergo a complete moult. The birds arrive between August and November or December (Thomas 1970; Thomas & Dartnall 1971; Pringle & Cooper 1975; Elliot *et al.* 1976). Thomas & Dartnall described the sequence and timing of flight moult in adults visiting Tasmania and Elliot *et al.*, the timing of primary moult in adults visiting South Africa. Moult usually begins in September or October and ends in January or February. Then the birds accumulate fat before leaving for the breeding grounds in March and April. Some, however, remain in southern Australia (and southern Africa) throughout the southern winter and are assumed to be immature (Thomas 1970).

In South Africa juveniles arrived in September and October about two weeks after the first influx of adults (Elliot *et al.* 1976). These birds did not have a complete moult nor did they deposit fat in February and March. They accounted for over 90% of birds that overwintered. Some second-year birds overwintered for a second year and the rest of the overwintering population was assumed to be second-year birds. In some areas juveniles began a partial moult of primaries in February, usually replacing the outer three to five (Elliot *et al.* 1976), but elsewhere they replaced no primaries (Pearson 1975; Waltner 1976). Thomas & Dartnall (1971) recorded no juveniles in their samples from Tasmania.

We scored the moult of 259 Curlew Sandpipers, including 177 juveniles, caught between March 1976 and April 1977 at Werribee Spit, near Melbourne, Vic., and found a similar pattern of moult in juveniles to that in South Africa. Juveniles arrived later than adults with comparatively new primaries which contrasted with the old, very worn feathers of the adults. By January their primaries were worn and contrasted with the now new primaries of the adults. Most juveniles (about 80%) began a partial moult of their primaries from January to March, replacing a variable number of outer primaries. Figure 1 shows the timing of this moult in relation to the timing of primary moult in adults. The moult usually began on the fifth, sixth or seventh primary (31/39 birds, 79%) and proceeded outwards to the tenth. One bird began with the second primary, another with the fourth and six (15%) with the first, but two of these arrested the moult after replacing eight primaries. These six birds may have been adults that had begun their moult much later than other adults or arrested it, perhaps because they were ill or injured. We classed them as juveniles because they had no signs of breeding plumage nor any reserves of fat. Six other birds arrested their primary moult and four of thirty-one juveniles caught after March had replaced no primaries (Fig 1). Moult of primaries in the two wings was usually symmetrical (31/39 birds) and most birds had or would have completed this partial moult by the end of April.

Feathers in other tracts were also replaced and these moults were also usually incomplete. Most juveniles started moulting rectrices and tertiaries in late November and December. Moult of rectrices usually began with the first or second (innermost feathers) and proceeded outwards but many omitted the fifth, fourth and fifth or third, fourth and fifth feathers. Others arrested the moult and only a few individuals (about 20%) replaced all rectrices. In February and March about half the birds moulted some secondaries, usually beginning with feathers midway through the tract and proceeding inwards. Again, some birds omitted feathers within this sequence and others arrested the moult.

Most juveniles had extensive body moult during November, December and January, a small amount in February and March and none in April and May. They did not develop breeding plumage nor gain weight in March and April (Fig. 2).

Juveniles of many palaearctic waders have similar partial moults of flight-feathers, e.g. the Ruff *Philomachus pugnax,* Common Sandpiper *Tringa hypoleucos,* Marsh Sandpiper *T. stagnatilis* and Wood Sandpiper *T. glareola* in South Africa (Tree 1974; Pearson 1975) and Red-necked Stint *Calidris ruficollis* in southern Australia (Paton & Wykes 1978) and this characteristic may be useful in ageing other palaearctic waders that visit Australia.

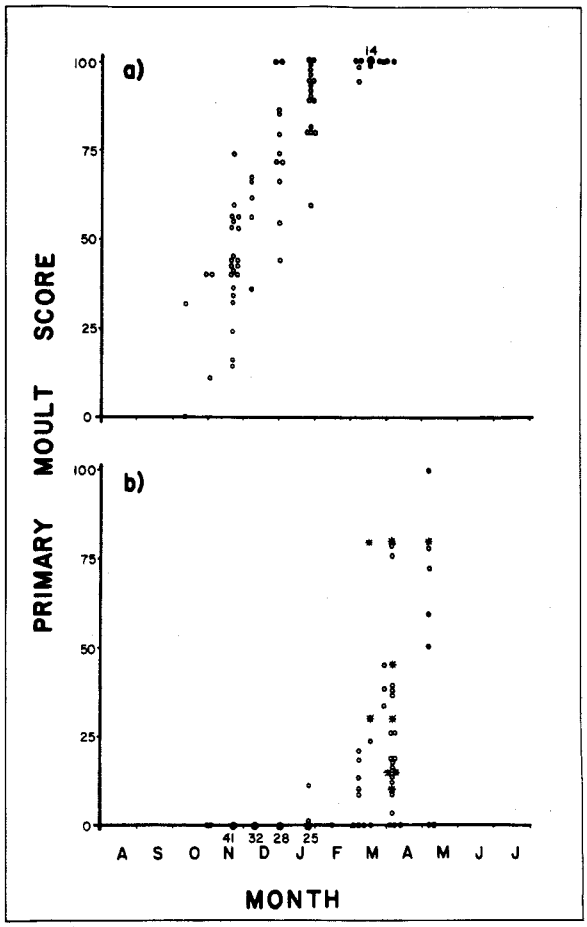

Figure 1. Timing of primary moult in adult (a) and juvenile (b) Curlew Sandpipers. Open circles – birds in active moult; closed circles – moult completed or still to commence; astericks – moult arrested before completing sequence (i.e. replacing tenth primary); large circles represent n birds. Methods used to score moult follow Ashmole (1962) where each feather is scored from 0 (old) to 5 (new). Complete replacement of all ten primaries on both wings scores 100.

Seventy-three per cent (135/185) of the Curlew Sandpipers that we caught in November, December and January were juveniles and we expected them to overwinter at Werribee. However, we saw few Curlew Sandpipers in June and July, as opposed to three to four thousand in summer, and caught none. Possibly juvenile Curlew Sandpipers move to other parts of southern Australia during winter. Local movements of juvenile Curlew Sandpipers occur in southern Africa in winter (Pearson 1975; Elliot *et al.* 1976). Local movements would not require

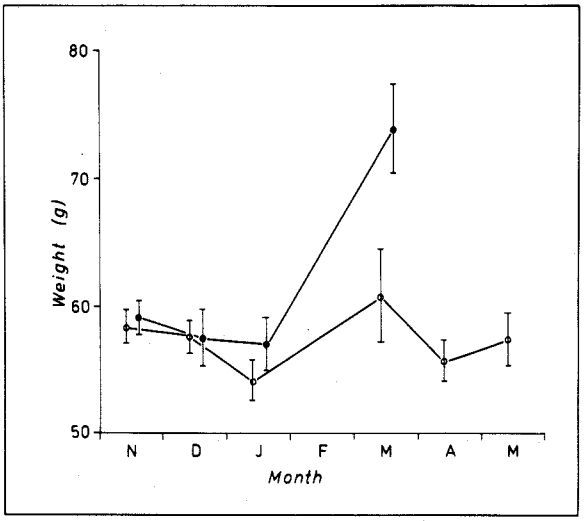

Figure 2. Mean weight of adult (solid circles) and juvenile (open circles) Curlew Sandpipers at different times in the year. The vertical bars represent the 95% confidence limits of the mean.

large deposits of fat and replacement of some flight-feathers might be of benefit. Thomas (1970) suggested that the large fluctuations in the numbers of waders overwintering in southern parts of Australia might be related to breeding success in the previous season. However, few birds remained during winter despite large numbers of juveniles in summer, which suggests that the food supply in winter may limit their numbers. The large fluctuations in numbers of overwintering birds may, however, be because the supply of food varies widely. Measurements of the food supply of palaearctic waders throughout the year and over many years will be important in understanding these fluctuations.

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NOTES ON SKUAS AND JAEGERS IN THE WESTERN TASMAN SEA

From 1 September 1976 to 30 April 1979 I kept records of skuas and jaegers sighted at sea from the *Simon Barjona*, out of Eden, NSW, 500 km south of Sydney. Records were not kept from June to September 1978 when the vessel was laid up. In all, I observed for 4,445 daylight hours but not at night. I could not make regular counts for defined periods but estimated totals seen each day and converted these to sightings per hour, thus avoiding the fluctuations from the many birds counted when hauling gear to the few seen during normal steaming or towing. I collected some specimens and took photographs for identification when possible.

The area covered lies between 36 and 38° S, roughly from Montagu Island to an area off the oil-fields in eastern Bass Strait. I recorded the temperatures of surface waters daily, the highest being 24.5°C off Tathra, NSW, during March 1979, and the lowest, 13°C near Cape Everard during December 1978. This illustrates the contrast from month to month in different areas, which however is levelled out by averaging (Fig 1.) A brief description of hydrological conditions in the area is given by Barton (1979).

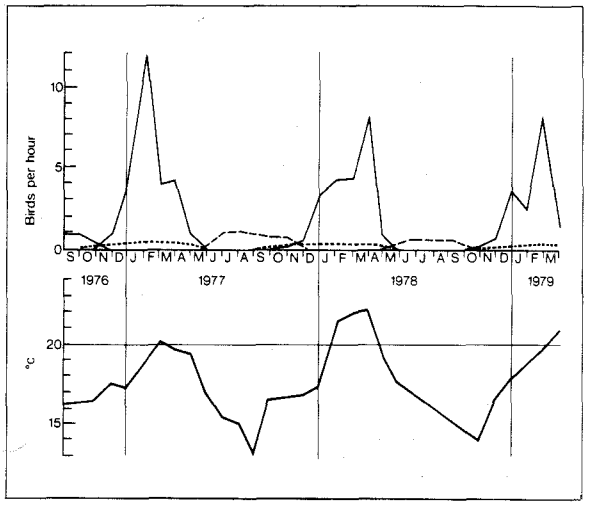

Figure 1. Frequency of observation of Southern Skua - - - - Pomarine Jaeger _____ and Arctic Jaeger . . . . . and mean temperature of sea water.

Stercorarius pomarinus Pomarine Jaeger

Pomarine Jaegers arrived in mid-October during about three weeks, a few being seen initially and later more, and more and constantly: largest numbers occurred in January 1977, March 1978 and February 1979. Milledge (1977) noted a peak off Sydney in January 1974. Temperatures of surface waters during these peaks differed from 18.5 °C in January 1977 to 22.3 °C in March 1978 and 20.5 °C in February 1979. The peaks occurred when Wedge-tailed Shearwaters *Puffinus pacificus* were also most numerous.

During summer, surface water normally moves south, at times up to four knots, and cooler water on the bottom and in midwater layers moves north offshore. As warm surface waters flow south, Pomarine Jaegers also move south into eastern Bass Strait, along with Wedge-tailed and Fleshy-footed Shearwaters *P. carneipes*, the movement generally follows the edge of the continental shelf, to its farthest point offshore, south of Cape Everard.

From mid April to early May congregations (up to 20 birds) of Pomarine Jaegers were noted each year along the edge of the continental shelf, some 25km offshore in the north to some 57km offshore in the south. These seemed to be pre-migratory gatherings, because each year, within a week of observing these flocks, the birds disappeared, apart from rare single sightings.

When the birds arrived, few had elongated central tail-feathers. By late April about 80% of adults had grown these feathers but all birds, adult and immatures, were in new plumage on body, wings and tail. Dark- and light-phased birds occurred in the