metre above the ground. Observations were made with the aid of binoculars and telescope through gaps between the boulders.

RESULTS

Cormorants were observed at eye-level from a distance of two to ten metres. They usually picked up pebbles as they walked to and from their nests. One bird was seen picking up and swallowing two pebbles while incubating. The numbers of pebbles swallowed in succession by a bird are given in Table 1. These numbers are minima because additional pebbles may have been swallowed while the Cormorant was out of sight.

The faeces of large numbers of Cormorants and Sea-lions gave a white-washed appearance to the surface of the island. From this white surface the Cormorants picked up small white round or ovoid objects that were pebbles washed with guano, each about as wide as the depth of the bill. The average depth of bills of seven adults was eleven millimetres (range 9–12 mm). The largest pebble that was swallowed was estimated to be 10 x 25 millimetres. Another, estimated to be 15 x 20 millimetres, was picked up and then rejected, presumably because it was too wide. One Cormorant after swallowing five pebbles tried in vain to take pieces from a solid conglomeratic rock.

The Cormorants mandibulated the items they picked up. Occasionally they picked up a soft piece of dirt, which they threw away with a sideways flick of the bill. If the item was a pebble. I heard a clicking sound, 'tick-tick-tick', as it was mandibulated before ingestion with visible swallowing movements of the throat.

TABLE I

Frequency with which Black-faced Cormorant swallowed various numbers of pebbles in succession.

No. pebbles	No. observations
1	15
2	12
3	9
4	3
5	4
6	4
7	1
8	1
10	2
12	1
16	2

DISCUSSION

The purposeful way in which the pebbles were taken suggests that they serve a function. Cormorants forage about once a day and regurgitate as pellets the residual contents of their stomachs also about once a day (van Dobben 1952). Hence if the pebbles serve a function, there is a continuing need to replace them. I have suggested (van Tets 1968a, 1968b) that the pebbles may serve to help overcome the greater buoyancy of salt water. That cormorants do not need stones to aid digestion has been shown by Cott (1961) and van Dobben (1952).

The average weight of seven adult Black-faced Cormorants was 1.5 kilograms (range 1.2-1.7 kg). Depending on salinity and temperature, the density of salt water is about 1.025. A Black-faced Cormorant would therefore need an additional 37.5 grams to compensate for a 25-mg/cc difference between the density of salt and fresh water.

If as an approximation the volume of a pebble is taken as the cube of its width (= 11 mm) and its density as 2.5 g/cc (cf. van Tets 1968a), then a Black-faced Cormorant can gain per pebble an additional (2.5–1.025) x 1.1^3 grams or 1.96 grams. The largest number of pebbles taken was sixteen and may represent a gain of 25.6 grams. This is about seventy per cent of what is required to compensate for a 25-mg/cc difference between the density of sea and fresh water. Near the mouths of rivers the density of sea water is considerably less and fewer pebbles would be needed.

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SOME REMARKS ON THE TAXONOMIC POSITION OF THE TREE SPARROW INTRODUCE INTO AUSTRALIA

The Tree Sparrow *Passer montanus* was first introduced into Victoria from Suffolk in 1862 (Sage 1956; Hobbs 1956; Le Souëf 1958). The first attempt was unsuccessful but shortly afterwards more birds safely arrived and in 1863 the Sparrows were set free. The first comments on the usefulness of the Sparrows against caterpillars date from 1867 but in the next year complaints arose about their harmfulness in orchards. Thus was the European Tree Sparrow acclimatized in Victoria.

A further question arises, however, concerning the countries from which the birds came and the subspecies that they represent. It is known that the first birds arrived from England but later it was mentioned only that they were 'Chinese' or from Europe.

On the occasion of a revision of subspecies, proposed for the International Biological Programme in 1974, through the kindness of Mr A. R. McEvey I have been able to see thirteen skins from the collections of the National Museum of Victoria and to compare them with 962 skins from other countries. Of these, nine specimens were old birds and four were young, the latter being similar in every subspecies.

This revision has proved that British Tree Sparrows are not identical with those of the Continent and therefore that *Passer montanus catellatus* Kleinschmidt, 1935, is a valid subspecies (Clancey 1948). The British Tree Sparrow is redder and smaller than the Continental birds.

More difficult is the question of the 'Chinese' Tree Sparrow. In a mixed population it is impossible to analyse to which subspecies it belongs. The differences are small and some adaptation can appear in a new country. We can therefore speak only of the various subspecific characters that the birds show in Australia by the terms 'saturatus' (Japanese form), 'catellatus' and 'montanus'. At first I thought that the characters appeared mixed and my comparison proved this to be so. The nine old birds, all collected in Royal Park, Melbourne, on 11 March 1953 except No. **B6645**, which was collected in the city of Melbourne on 13 June 1952, are as follows:

Reg. No. B6632, ♂ ; cap 'montanus', back 'saturatus', rump 'catellatus', underside 'montanus', bill 'saturatus'.

B6635, ♂ ; cap 'montanus', back also, rump 'catellatus', underside 'montanus', bill 'saturatus'.

B6639, ♀ ; cap 'montanus', back and rump 'catellatus', underside also, bill 'saturatus'.

B6640, ♂ ; head, chin and wing-coverts in moult; on the cap a juvenile mark; back, rump and underside 'catellatus, bill 'saturatus'.

B6641, ♂ ; cap, back, rump and underside 'catellatus', bill 'saturatus'.

B6642, ♂ ; cap 'montanus', back 'catellatus', rump also, underside 'montanus', bill 'saturatus'.

B6643, ♂ ; head and chin in moult, on the cap a juvenile mark, back, rump and underside 'catellatus', bill 'saturatus'.

B6644, ♀ ; chin in moult; cap 'montanus', back, rump and underside 'catellatus', bill 'saturatus'.

B6645, ♂ ; cap 'saturatus', back 'montanus', rump 'catellatus', underside slightly stained, bill 'montanus'.

Measurements of wings seem small, smaller than in Continental birds and even smaller than in Japanese; perhaps also smaller than in British birds but the series is too short for a significant result: 65, 66, 67, 68, 68, 68, 69, 70 and 73 millimetres.

In summary, the eastern Asiatic Tree Sparrow has had a great influence on the Australian population but the extent to which it has produced a subspecific character rather than merely a local variation, as in the House Sparrow *Passer domesticus* (Keve 1966) is not answered. In its life-history in Australia the Tree Sparrow shows characters of both European and Asiatic populations: it lives partly in suburbs and gardens as in Europe and partly in towns as in Asia. The moulting season is certainly different from that of the European form. Even in my small amount of material young birds were moulting in March. Thus, the Australian population has several special characters.

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