

MEASUREMENTS OF BUSH BIRDS ON LITTLE BARRIER ISLAND, NEW ZEALAND

By B. J. GILL and C. R. VEITCH

ABSTRACT

We give weights and measurements of 16 species of birds mist-netted in forest on Little Barrier Island, including 67 Whiteheads (*Mohoua albicilla*) and 111 Stitchbirds (*Notiomystis cincta*). The following criteria for distinguishing sexes were established. Female Whiteheads weighed up to 15.9 g and males weighed 16.1 g or more. Most female Stitchbirds had wings up to 92 mm long and most males had wings 95 mm or longer. Incidental observations of moult, ectoparasites and movements are recorded.

INTRODUCTION

Robertson *et al.* (1983) pointed out the importance of measurements of live birds and that such data were few in New Zealand. Here we report measurements of some 250 birds that we mist-netted on Little Barrier Island between 1979 and 1986. We obtained large samples of sexed Whiteheads (*Mohoua albicilla*) and Stitchbirds (*Notiomystis cincta*) and small samples of the following species: Red-crowned Parakeet (*Cyanoramphus novaezelandiae*), Kingfisher (*Halcyon sancta*), Hedgesparrow (*Prunella modularis*), Grey Warbler (*Gerygone igata*), Fantail (*Rhipidura fuliginosa*), Tit (*Petroica macrocephala*), Robin (*P. australis*), Song Thrush (*Turdus philomelos*), Blackbird (*T. merula*), Tui (*Prosthemadera novaeseelandiae*), Chaffinch (*Fringilla coelebs*) and House Sparrow (*Passer domesticus*).

STUDY AREA AND METHODS

Most birds were netted in low forest on the flats and slopes within about 2 km of the bunkhouse at the south-west corner of Little Barrier Island (36°13'S, 175°03'E). All Whiteheads were measured by BJG in June and August 1984 and February, April and November 1986. All Stitchbirds were measured by CRV in February and August 1979, April 1980, March 1981, August 1983, February and August 1984 and March and April 1985. Various observers (but mainly BJG and CRV) measured the other species throughout the above times.

Weight and linear measurements were taken as described by Gill & McLean (1986) – wing (unstraightened chord), tail (base to tip), tarsus (ankle notch to edge of bent-over foot) and bill (anterior edge of nostril to tip). This tarsal measurement is not the traditional one but is easier to take in the field. It was used by Craig *et al.* (1981). The bill measurement is also unorthodox but is less equivocally defined than measurements based on the edge of the feathering (“exposed culmen”) or the base of the skull (which is obscured by feathering). Weights and measurements were recorded to the nearest unit or tenth of a unit, as indicated by the presence or absence of the decimal point in the data in Appendix 1 and ranges shown in Tables 1–5.

Where the sexes of birds were distinguished, it was by their plumage in strongly sexually dimorphic species (Tit, Blackbird, Stitchbird, Bellbird, Chaffinch, House Sparrow) or by known morphometric differences (Red-crowned Parakeet, Whitehead, Tui). All birds in the analysis were young-of-the-year or older; recent fledglings were excluded.

TABLE 1 —Weights (g) of birds mist-netted on Little Barrier Island

Species	Sex	Mean	n	S.d.	Range
Whitehead	male	70.6	42	1.90	67-74
	female	65.1	25	1.76	62-69
Grey Warbler	-	50.1	7	1.07	49-52
Fantail	-	71.3	15	2.96	66-75
Tit	male	66.1	7	1.77	63-69
	female	63.8	5	0.84	63-65
Blackbird	female	121.8	6	1.33	120-124
Silvereye	-	59.0	6	1.41	57-61
Stitchbird	male	98.4	54	2.66	93-103
	female	88.6	45	2.53	85-94
Bellbird	male	84.6	19	2.52	80-88
	female	74.6	11	2.20	71-78

TABLE 2 —Wing lengths (mm) of birds mist-netted on Little Barrier Island

Species	Sex	Mean	n	S.d.	Range
Whitehead	male	18.27	42	1.05	16.1-20.6
	female	14.08	25	0.90	12.3-15.9
Grey Warbler	-	6.16	5	0.37	5.7-6.7
Fantail	-	7.56	14	0.78	6.5-8.7
Tit	male	9.81	7	0.45	9.3-10.6
Silvereye	-	12.90	5	1.06	11.7-14.5
Stitchbird	male	37.29	59	2.70	29-42
	female	30.16	50	1.72	26-35
Bellbird	male	29.74	14	2.49	25-34
	female	21.60	6	0.58	21-22

TABLE 3 —Tail lengths (mm) of birds mist-netted on Little Barrier Island

Species	Sex	Mean	n	S.d.	Range
Whitehead	male	64.1	41	3.19	57-72
	female	60.4	24	2.39	57-66
Grey Warbler	-	46.3	7	2.29	43-50
Fantail	-	89.9	14	4.76	83-98
Tit	male	50.4	7	2.44	47-54
Blackbird	female	102.8	6	3.82	97-107
Silvereye	-	45.5	6	1.64	43-47
Stitchbird	male	75.9	54	2.79	66-80
	female	69.1	44	2.63	64-75
Bellbird	male	82.5	14	2.90	77-86
	female	65.3	6	5.54	59-71

RESULTS AND DISCUSSION

The data are summarised in Table 1 (weight), Table 2 (wing), Table 3 (tail), Table 4 (tarsus), Table 5 (bill) and Appendix 1 (raw data for samples less than 5).

Whitehead

The morphometrics of Whiteheads on Little Barrier Island were given by Gill & McLean (1986). In Fig. 1 of that paper, weight is plotted as a function of wing length to give a fair separation of males from females. Four birds were considered to be of uncertain sex because their points on the graph, although closer to the male scatter than to the female, fell close to a "known female"

TABLE 4 —Tarsal lengths (mm) of birds mist-netted on Little Barrier Island

Species	Sex	Mean	n	S.d.	Range
Whitehead	male	27.94	42	0.95	25.4–29.7
	female	26.18	25	0.90	24.6–27.5
Grey Warbler	-	19.97	7	0.78	19.0–21.2
Fantail	-	19.74	15	0.71	18.2–20.6
Tit	male	21.71	7	0.45	21.0–22.4
	female	21.78	5	0.59	20.9–22.4
Blackbird	female	32.87	6	1.32	30.9–34.5
Silvereye	-	18.63	6	0.64	17.5–19.2
Stitchbird	male	29.03	59	0.65	26.7–30.2
	female	27.74	52	0.67	26.4–29.3
Bellbird	male	26.31	15	0.66	25.4–27.5
	female	25.01	7	1.02	24.0–26.8

TABLE 5 —Bill lengths (mm) of birds mist-netted on Little Barrier Island

Species	Sex	Mean	n	S.d.	Range
Whitehead	male	7.82	42	0.37	7.0–9.0
	female	7.02	25	0.31	6.5–7.7
Grey Warbler	-	6.30	6	0.35	5.8–6.6
Fantail	-	4.90	12	0.33	4.4–5.5
Tit	male	7.13	7	0.21	6.9–7.5
Blackbird	female	15.48	5	0.47	14.9–16.2
Bellbird	male	9.88	6	0.37	9.6–10.4

of weight 16.4 g and wing length 69 mm. Subsequent behavioural observations and remeasurements have shown that this bird was wrongly sexed and was a male. That being so, the four uncertain birds were almost certainly males. Therefore, in the graph, there is a complete separation of males (minimum weight 16.0 g) and females (maximum weight 15.7 g).

The Whitehead data presented here are a sample of 67 birds (42 males, 25 females) measured by one observer and sexed from their weight and wing length using the graph in Gill & McLean (1986) with the adjustment outlined in the previous paragraph. This sample is larger than that represented by Table 1 of Gill & McLean (1986). The minimum female weight can now be defined as 15.9 g and the minimum male weight as 16.1 g.

When female 254 was caught in August 1984 she had an old wound at the back of the skull – a straight, transverse cut that left the skull exposed. This appeared to cause no ill-effect for she was resighted four times, the last occasion in March 1987.

Grey Warbler

A female caught on 25 November 1986 had a shelled egg within her abdomen and weighed 9.1 g, well above average (6.4 g; Gill 1980).

Silvereye

One was caught in February 1979 and in June 1984; two in February 1986 and two in November 1986. One was seen in February 1989. In August 1984 and March–April 1985 teams catching Stitchbirds for translocation operated up to 60 mist-nets for a total of 2516 mist-net hours. There was one Silvereye among the 825 birds of all species caught.

Diamond & Veitch (1981) suggested that Silvereyes are excluded from Little Barrier's unbrowsed forest by the intact native bird community.

Stitchbird

Craig *et al.* (1981) established preliminary morphometric criteria for sexing Stitchbirds based on measurements of 13 birds. They found that only males had tarsi 28.5 mm or longer. Our larger sample shows a highly significant sexual difference in tarsal length (t-test, $P > 0.001$) but such overlapping ranges that this character becomes unreliable for individuals.

Craig *et al.* (1981) found that only males had wings 90 mm or longer. In our sample there was overlap at 93 mm and 94 mm, but most males had wings 95 mm or longer, and most females had wings 92 mm or shorter, confirming wing length as a fairly reliable discriminator.

Moult

Wing and/or tail moult of Whitehead, Grey Warbler, Silvereye and Chaffinch was noted in mid-February 1986 and not at other times. Tits had moulting tails in February 1979, and a Robin was completing wing moult in early March 1981. A Fantail with immature brownish plumage when caught in February 1986 had moulted into adult plumage by April of that year when it was recaptured. Juvenile Stitchbirds moulted into adult plumage during March-April of their first year.

Ectoparasites

In general the birds handled had high burdens of ectoparasites. Mallophaga were noted on Blackbird; feather-mites on Whitehead, Fantail, Tit and Bellbird; crawling mites on Bellbird; and hippoboscids on New Zealand Pigeon (*Hemiphaga novaeseelandiae*), Red-crowned Parakeet, Whitehead, Fantail, Song Thrush and Bellbird. Samples of the flies have been deposited in the entomological collections at Auckland Museum.

Movements

Two Bellbirds (one of each sex) were recaptured 0.45 km from their place of banding 7 and 9 months later. In the bush behind the bunkhouse, a female Tit was caught 100 m from where she was banded the previous day (November 1986).

ACKNOWLEDGEMENTS

This study was funded in part by grants to Auckland Museum from the New Zealand Lottery Board. We thank the Banding Office (Department of Conservation) for supplying metal bands and I. G. McLean for comments on a draft of this paper.

LITERATURE CITED

- CRAIG, J.L.; DOUGLAS, M.E.; STEWART, A.M.; VEITCH, C.R. 1981. Specific and sexual differences in body measurements of New Zealand honeyeaters. *Notornis* 28: 121-128.
 DIAMOND, J.M.; VEITCH, C.R. 1981. Extinctions and introductions in the New Zealand avifauna: cause and effect? *Science* 211: 499-501.
 GILL, B.J. 1980. Abundance, feeding, and morphology of passerine birds at Kowhai Bush, Kaikoura, New Zealand. *NZ J. Zool.* 7: 235-246.
 GILL, B.J.; McLEAN, I.G. 1986. Morphometrics of the Whitehead *Mohoua albigilla* on Little Barrier Island, New Zealand. *NZ J. Zool.* 13: 267-271.
 ROBERTSON, H.A.; WHITAKER, A.H.; FITZGERALD, B.M. 1983. Morphometrics of forest birds in the Orongorongo Valley, Wellington, New Zealand. *NZ J. Zool.* 10: 87-98.

B.J. GILL, *Auckland Institute & Museum, Private Bag, Auckland*;
 C.R. VEITCH, *Department of Conservation, Private Bag 8, Newton, Auckland*

APPENDIX 1 —Weights (g) and measurements (mm) of birds mist-netted on Little Barrier Island; samples less than 5

WEIGHT

Red-crowned Parakeet: male 69, 75; female 65, 66, 67, 75
 Kingfisher: 63
 Hedge Sparrow: 19, 22.5
 Tit: female 9.3, 9.7, 9.9
 Robin: 29, 30
 Song Thrush: 63.1
 Blackbird: male 81.3, 92.0; female 84.9, 85.3, 91.6
 Tui: male 111, 125, 145; female 79
 Chaffinch: male 18.7, 23.3
 House Sparrow: male 28.0

WING

Red-crowned Parakeet: male 121; female 115, 116, 116, 120
 Kingfisher: 97, 100, 101
 Hedge Sparrow: 65, 69
 Robin: 86, 87
 Song Thrush: 108, 112
 Blackbird: male 123, 125, 129, 131
 Tui: male 141, 144, 152; female 126
 Chaffinch: male 82, 83
 House Sparrow: male 75

TAIL

Red-crowned Parakeet: male 137; female 119, 121, 124, 130
 Kingfisher: 64, 65, 68
 Hedge Sparrow: 59, 63
 Tit: female 48, 49, 49
 Robin: 63, 65
 Song Thrush: 84
 Blackbird: male 109, 111
 Tui: male 114, 118, 121; female 103
 Chaffinch: male 61, 67
 House Sparrow: male 58

TARSUS

Red-crowned Parakeet: male 18.9; female 18.9, 20.2, 21.1, 21.1
 Kingfisher: 16.2
 Hedge Sparrow: 20.8, 22.0
 Robin: 34.3, 34.8
 Song Thrush: 32.3, 32.4
 Blackbird: male 32.3, 32.7, 35.4, 36.0
 Tui: male 40.0, 40.8, 42.1; female 35.6
 Chaffinch: male 17.5, 18.7
 House Sparrow: male 21.0

BILL

Kingfisher: 29.0, 30.2
 Hedge Sparrow: 9.0
 Tit: female 7.0, 7.2, 7.4
 Song Thrush: 12.5, 12.5
 Blackbird: male 16.2, 16.3, 16.9
 Silvereye: 6.3, 7.7, 8.0, 8.0
 Bellbird: female 8.5, 8.6, 8.9
 Chaffinch: male 9.5, 10.4
 House Sparrow: male 10.0