

Description of a new subspecies of *Coenocorypha* snipe from subantarctic Campbell Island, New Zealand

COLIN M. MISKELLY*

Wellington Hawke's Bay Conservancy, Department of Conservation, P.O. Box 5086, Wellington 6145, New Zealand

ALLAN J. BAKER

Department of Natural History, Royal Ontario Museum, Toronto, ON M5S 2C6, Canada

Department of Ecology and Evolutionary Biology, University of Toronto, Toronto, ON M5S 3B2, Canada

Abstract A new subspecies of *Coenocorypha* snipe from Campbell I is described and named. This bird was discovered on rat-free 19 ha Jacquemart I in 1997, and had probably been confined there as a breeding species for about 170 years. Norway rats (*Rattus norvegicus*) were eradicated from 11,268 ha Campbell I in 2001, and snipe soon began to recolonise the main island from Jacquemart I 1 km offshore. Twelve adults and 5 chicks were caught on Campbell I in Jan 2006, and 1 nest was found. Genetic analysis of blood samples, and measurements and plumage descriptions from these birds revealed that they were best regarded as a subspecies of *Coenocorypha aucklandica*, a species here recognised as confined to the subantarctic Auckland, Antipodes and Campbell Is, and specifically distinct from the 2 other extant *Coenocorypha* snipes (Snare I snipe *C. huegeli* and Chatham I snipe *C. pusilla*).

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Keywords Campbell Island snipe; New Zealand snipe; subantarctic snipe; *Coenocorypha aucklandica*; new subspecies; taxonomy

INTRODUCTION

On 9 Nov 1997 Dave Barker, Jeremy Carroll, James Fraser and 3 bird-locator dogs were landed via helicopter on sheer-sided Jacquemart I off the south coast of Campbell I in the New Zealand subantarctic (Fig. 1). Their objective was to search rat-free islets around Campbell I for a second population of the flightless Campbell I teal (*Anas nesiotis*). In this they were unsuccessful, but within minutes of landing on Jacquemart I the dogs flushed a snipe (*Coenocorypha* sp.), a species that they were not expecting to encounter. One bird was caught during their 3 hours on the 19 ha islet, and the dogs indicated the presence of snipe at 9 other sites among the tall

tussock grass (*Poa litorosa* and *P. foliosa*) (Barker *et al.* 2005).

No one has returned to Jacquemart I, but snipe have subsequently been found on the adjacent coast of Campbell I (11,268 ha). Norway rats (*Rattus norvegicus*) were eradicated from Campbell I in 2001 (McClelland & Tyree 2002), and within 2 years evidence of snipe recolonising naturally from Jacquemart I (1 km offshore) was found. Probable snipe footprints were found in May 2003, and a fully grown chick was caught in Mar 2005, both at the head of Monument Harbour, about 2 km from Jacquemart I (Barker *et al.* 2005). Both the adult snipe caught on Jacquemart I in 1997 and the fledgling caught on Campbell I in 2005 were photographed and released without genetic samples being collected (Barker *et al.* 2005).

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*Corresponding author: cmiskelly@doc.govt.nz

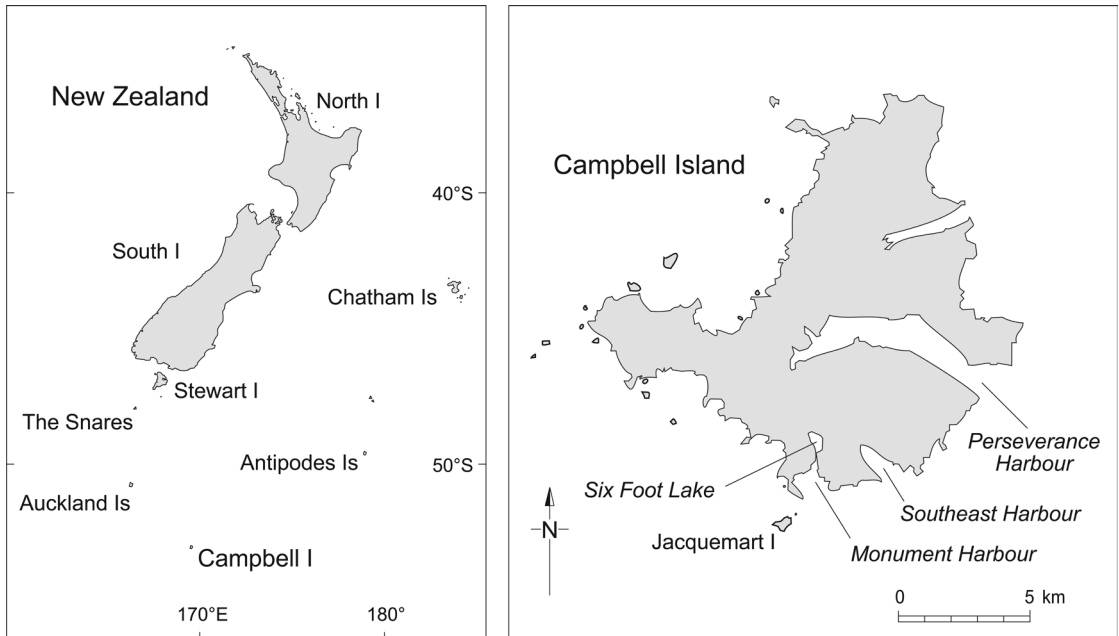


Fig. 1. Location of Campbell I and Jacquemart I.

Before 1997 it was not known that *Coenocorypha* snipe occurred in the Campbell I archipelago (Miskelly 2000), although 2 possible 1952 sightings from the main island immediately adjacent to Jacquemart I have since come to light (Miskelly 2006; Miskelly & Norton 2008). *Coenocorypha* snipe formerly occurred throughout the New Zealand region and as far north as Norfolk I, Fiji and possibly New Caledonia (Worthy & Holdaway 2002; Worthy 2003). Up to 11 taxa have been recognised, but only 8 have been formally described, and opinions differ on how many species are represented (Turbott 1990; Higgins & Davies 1996; Holdaway *et al.* 2001; Worthy & Holdaway 2002; Worthy *et al.* 2002; Worthy 2003; Baker *et al.*, *in press*). Genetic analyses of blood and feather samples from the 4 extant named taxa plus birds from Campbell I (see below) indicated that 3 species and 2 additional subspecies should be recognised (Baker *et al.*, *in press*). From north to south these were Chatham I snipe *C. pusilla*, Snares I snipe *C. huegeli*, Antipodes I snipe *C. aucklandica meinertzhagenae*, Auckland I snipe *C. aucklandica aucklandica*, and Campbell I snipe *C. aucklandica* undescribed subspecies.

JANUARY 2006 SURVEY

James Fraser, Colin Miskelly and a bird locator dog surveyed the Six Foot Lake catchment on Campbell I for snipe during 7-15 Jan 2006 (Miskelly & Fraser 2006). Twelve adult birds (Fig. 2) and 5 chicks (3 broods; Fig. 3) were caught, and 1 nest found

(Miskelly & Fraser 2006; Miskelly *et al.* 2006b). Information was also collected on vocalisations and aerial displays of the Campbell I birds and was compared to other *Coenocorypha* snipe (Miskelly & Fraser 2006; Miskelly *et al.* 2006a).

One of the birds caught during the 2006 survey was accidentally injured during capture when its left humerus was fractured by the rim of a hand-net. This bird, a non-breeding female, was euthanised and preserved as a potential type specimen. Blood samples from all 12 adults and the 3 largest chicks captured were used for DNA sexing (results below) and were also analysed by Baker *et al.* (*in press*) who compared microsatellite allele frequencies and mitochondrial haplotype frequencies with those from 5 other *Coenocorypha* populations of 4 taxa. Measurements were taken from all 17 Campbell I snipe handled in Jan 2006, and all adult birds were photographed.

SYSTEMATICS

Order Charadriiformes

Family Scolopacidae

Coenocorypha G.R. Gray, 1855

Coenocorypha aucklandica (G.R. Gray, 1845)

Coenocorypha aucklandica perseverance new subspecies

Vernacular name: Campbell Island snipe

Type locality: Monument Harbour, Campbell Island, New Zealand.



Fig. 2. Adult Campbell I snipe, Campbell I, Jan 2006. Photos by James Fraser.

Holotype

Immature female: bill length 58.7, tarsus 26.3, mid-toe and claw 34.6, wing 108, tail 34.6 (field measurements (mm) taken by CMM). Fresh mass 99 g. Collected by C.M. Miskelly on 11 Jan 2006. Prepared as study skin MNZ OR27631, extended

right wing OR27631/1, partial skeleton OR27631/a, and soft tissues in 70% ethanol OR27631/b, and retained at Te Papa Tongarewa/Museum of New Zealand. The gonads were not visible during skin preparation (Noel Hyde, *pers. comm.* 2006), and so the bird was probably a 1-year-old pre-breeder.



Fig. 3. A. Campbell I snipe nest. B. Campbell I snipe chick estimated age 8 days. C. Campbell I snipe chick estimated age 36 days. Photo A by Colin Miskelly, B & C by James Fraser.

Its sex was determined by genetic methods at the Royal Ontario Museum.

Description and diagnosis

The size, plumage and proportions of the birds in the field aligned them with Auckland I snipe *C. aucklandica aucklandica* and Antipodes I snipe *C. aucklandica meinertzhagenae*, and this was confirmed genetically by Baker *et al.* (*in press*), who recommended that all 3 forms be considered subspecies of *C. aucklandica*. The following description and diagnosis therefore focuses on differences between the Campbell I snipe

(*perseverance*), Auckland I snipe (*aucklandica*) and Antipodes I snipe (*meinertzhagenae*).

Male *aucklandica* and *meinertzhagenae* were darker dorsally than females (apparent in museum specimens; C.M.M., *pers. obs.*), therefore the holotype (female) of *perseverance* was compared with skins of 6 female *aucklandica* (4 from Adams I, 1 from Disappointment I, 1 from Ewing I) and 4 female *meinertzhagenae* held in Te Papa Tongarewa/Museum of New Zealand. Differences noted between the 3 taxa were then compared with photographs of 56 hand-held and DNA-sexed adult snipe taken in the field: 12 *perseverance*, including the

Fig. 4. Holotype skin of female Campbell I snipe OR27631 (far right) compared to Antipodes I snipe female OR704 (left), and Auckland I snipe females from Ewing I OR13092 (2nd from left) and Adams I OR13089 (3rd from left). All specimens held in Te Papa Tongarewa/Museum of New Zealand. A. Ventral. B. Dorsal. Note that OR27631 has had its right wing removed.



holotype; 35 *aucklandica* (15 from Adams I, 16 from Rose I, 4 from Enderby I), and 9 *meinertzhagenae*. Note that *meinertzhagenae* were darker dorsally and on the breast than *aucklandica*, they had yellowish underparts, and they had grey legs compared to the typically pale yellow legs of *aucklandica* (Rothschild 1927; Higgins & Davies 1996; C.M.M., pers. obs.).

Campbell I snipe were darker dorsally than both *aucklandica* and *meinertzhagenae* (Fig. 4); the

blackish subterminal marks on the scapulars were as prominent as in *meinertzhagenae* but the fringes of the scapulars and upper wing coverts were darker (rufous-brown and dark buff) compared to the pale buff of the 2 other taxa. The rump was rufous-brown finely barred with black; this barring was finer than in *meinertzhagenae*, and similar to but more prominent than in *aucklandica*. The belly lacked barring in all 3 taxa (cf. *huegeli*); all 3 had barred

Table 1. Field measurements of 12 adult Campbell I snipe (*Coenocorypha aucklandica perseverance*). Sexes were determined genetically. Measurements in millimetres apart from mass (grams). Wing flattened and straightened. The first row of female data are from the holotype.

Sex	Culmen	Tarsus	Mid toe & claw	Tail	Wing	Mass
Male	54.7	26.3	32.8	37.4	105	85
	55.7	26.1	33.2	35.5	104	87
	54.1	25.7	34.9	34.4	105	90
	57.7	25.6	35.4	32.6	102	87
	55.4	26.0	35.9	35.6	104	94
	57.8	26.6	34.6	36.8	108	91
Female	58.7	26.3	34.6	34.6	108	99
	55.3	26.3	33.3	34.4	102	95
	56.8	26.7	35.1	31.5	104	107
	57.4	26.2	34.6	31.1	106	106
	56.5	26.3	34.6	36.6	102	102
	59.9	28.0	38.7	37.0	111	105

Table 2. Summary measurements (mean \pm standard deviation) for 4 populations of subantarctic snipe (*Coenocorypha aucklandica*). Sample sizes in parentheses. Full measurements were not obtained for all birds, and so sample sizes were smaller for some populations and parameters as follows. Males: Antipodes tail (17); Port Ross mid toe & claw (9), tail (9); Adams I tail (4). Female: Antipodes mass (4); Port Ross tail (9), wing (9); Adams I tail (2). Measurements in millimetres apart from mass (grams). Antipodes I snipe measurements include those for 7 birds reported by Warham & Bell (1979).

Sex	Population	Culmen	Tarsus	Mid toe & claw	Tail	Wing	Mass
Male	Antipodes (18)	61.0 \pm 2.4	26.4 \pm 0.5	35.0 \pm 0.8	37.4 \pm 4.1	104.6 \pm 4.0	92.2 \pm 5.6
	Port Ross (10)	63.1 \pm 2.5	27.9 \pm 0.9	35.3 \pm 1.1	39.4 \pm 3.5	108.0 \pm 5.1	100.8 \pm 5.1
	Adams I (10)	60.2 \pm 2.0	26.0 \pm 0.9	33.3 \pm 2.0	36.0 \pm 1.5	103.2 \pm 5.0	91.0 \pm 7.6
	Campbell (6)	55.9 \pm 1.5	26.1 \pm 0.4	34.5 \pm 1.2	35.4 \pm 1.7	104.7 \pm 2.0	89.0 \pm 3.3
Female	Antipodes (5)	62.7 \pm 2.5	26.9 \pm 1.1	35.3 \pm 1.2	35.2 \pm 7.0	104.0 \pm 6.0	117.3 \pm 10.5
	Port Ross (10)	65.0 \pm 1.8	28.3 \pm 0.6	35.3 \pm 1.3	37.6 \pm 4.5	107.8 \pm 5.6	127.2 \pm 16.5
	Adams I (5)	63.3 \pm 2.0	26.0 \pm 0.7	34.1 \pm 1.2	35.7 \pm 4.3	101.8 \pm 3.2	94.0 \pm 3.9
	Campbell (6)	57.4 \pm 1.6	26.6 \pm 0.7	35.2 \pm 1.8	34.2 \pm 2.5	105.5 \pm 3.6	102.3 \pm 4.6

flanks, but both *aucklandica* and *meinertzhagenae* had barring encroaching further onto the sides of the belly than *perseverance*. All Campbell I snipe handled had a characteristic pinkish cast over the belly feathers, a condition seen in about 10% of *aucklandica*. The centre of the belly was off-white in *perseverance*, cream in *aucklandica*, and pale yellow in *meinertzhagenae* (Fig. 4). The gorget of flecks and chevrons across the breast of *perseverance* was as heavily pigmented as the darkest *meinertzhagenae*, but the gorget did not extend as far towards the belly as in either *meinertzhagenae* or *aucklandica*.

The pale chin patch of *perseverance* was slightly smaller than that of *meinertzhagenae*, and both were markedly smaller than that of *aucklandica*.

Campbell I snipe had significantly shorter bills than other populations of subantarctic snipe (Tables 1-3; Fig. 5). They were generally smaller than both Auckland I snipe and Antipodes I snipe, but the comparison was complicated by the previously unrecognised size variation within Auckland I snipe, with birds handled on Rose and Enderby Is (Port Ross) being considerably larger than those caught on Adams I (Tables 2 & 3; Fig. 5).

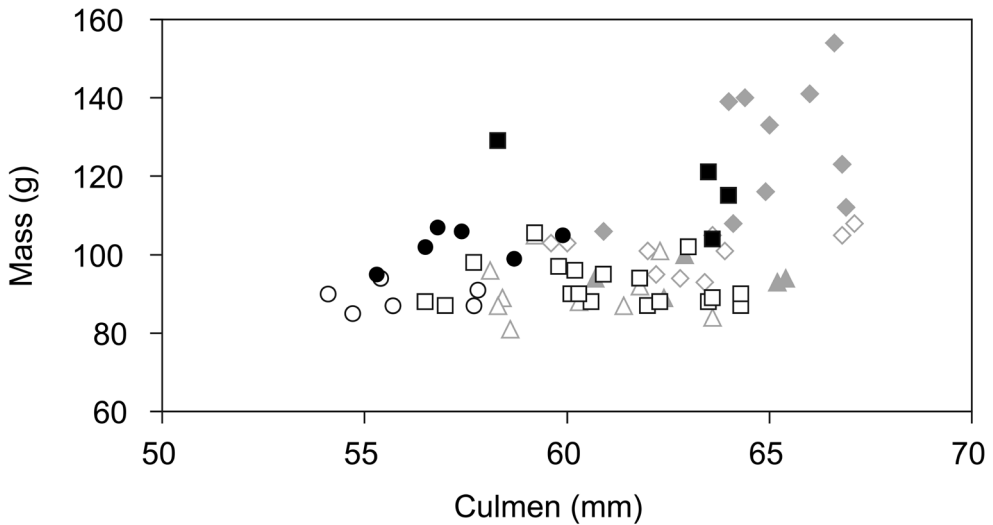


Fig. 5. Size variation (mass and culmen length) for 4 populations of subantarctic snipe (*Coenocorypha aucklandica*): Adams I (*C. a. aucklandica*) triangles, Port Ross Is (*C. a. aucklandica*) diamonds, Antipodes I (*C. a. meinertzhagenae*) squares, Campbell I (*C. a. perseverance*) circles; males open symbols, females solid symbols. Populations considered to be nominate *C. a. aucklandica* shown in grey.

Leg colours were described arbitrarily in the field, and grouped into 5 wider classes for analysis (Table 4). Male *meinertzhagenae* and female *aucklandica* from Port Ross Is tended to have grey legs, while male *aucklandica* from Port Ross had leg colours that ranged between grey and yellow (leg colour was recorded for only 2 female *meinertzhagenae*). Both sexes of Campbell I snipe had leg colours that ranged between pale yellow and yellow (or green-yellow in females), as did both sexes of *aucklandica* from Adams I.

The sole Campbell I snipe nest contained 2 eggs that were blunt pyriform, olive-brown and heavily marked with blotches of mid grey and dark brown, especially around the widest part; 42.1 × 30.5 and 44.3 × 30.8 mm (Fig. 3a). The 2 eggs were fresh when found on 12 Jan 2006, and weighed 21.5 and 22.7 g, respectively (Miskelly *et al.* 2006b). One egg was damaged and both were abandoned on 14 Jan 2006, and they are now in Te Papa Tongarewa/Museum of New Zealand (MNZ OR27632).

The youngest chicks observed were estimated to be 8 days old, based on growth rates of *C. huegeli* chicks (Miskelly 1999). They were entirely covered in relatively unpatterned dark grey down with buff and rufous tips, with a narrow dark mid-crown stripe, another dark stripe from bill to eye, and a short dark malar stripe (Fig. 3b). Their bills were dark grey, paler at the base, and their legs were dark grey or olive-grey. Fully-feathered chicks, estimated to be 36 and 37 days old with only a trace of down on their nape (Fig. 3c), were still accompanied by adults. At this age the bill was

swollen and purplish-grey basally compared to the more slender basally pale-brown bills of adults (compare Figs 2b and 3c). Leg colour of these older chicks was pale olive-grey. Measurements and estimated ages of the 5 chicks handled in Jan 2006 are given in Table 5.

Mitochondrial DNA haplotypes and microsatellite alleles

Campbell I snipe exhibited very limited genetic variation (Baker *et al.*, *in press*). All 15 birds sampled shared the same mtDNA haplotype (cf. 16 haplotypes present in the 5 other populations of *Coenocorypha* snipes, with 9 haplotypes in the Adams I population), and only 16 microsatellite alleles were detected at 9 variable loci (1.78 alleles per locus, mean observed heterozygosity = 0.185, mean expected heterozygosity = 0.235). The single mtDNA haplotype was shared with Antipodes I snipe (which also was invariable) and the Adams I (but not Port Ross) population of Auckland I snipe. None of the 16 microsatellite alleles was private, but their frequency was significantly different from all other populations: Bonferroni-corrected comparisons with Port Ross Is ($F_{st} = 0.26$), Adams I ($F_{st} = 0.23$) and Antipodes I populations ($F_{st} = 0.57$, all $P < 0.01$).

Etymology

The subspecific name *perseverance* is a noun in apposition, after the brig *Perseverance* with which Captain Frederick Hasselburgh discovered Campbell I in 1810 (Kerr 1976). The same vessel

Table 3. Size differences in 4 populations of subantarctic snipe *Coenocorypha aucklandica*, separated by sex. For each parameter, populations are sorted from smallest measurement to largest. Horizontal bars link populations that did not differ significantly in size (Tukey HSD for multiple comparisons, $P > 0.05$). Abbreviations: ADAMS = Adams I (*C. a. aucklandica*), ANTIP = Antipodes I (*C. a. meinertzhagenae*), CAMPB = Campbell I (*C. a. perseverance*), PROSS = Port Ross Is (*C. a. aucklandica*). Samples sizes are given in Table 2.

Parameter	Sex	Smallest			Largest
Culmen	Male	CAMPB	ADAMS	ANTIP	PROSS
	Female	CAMPB	ANTIP	ADAMS	PROSS
Tarsus	Male	ADAMS	CAMPB	ANTIP	PROSS
	Female	ADAMS	CAMPB	ANTIP	PROSS
Mid toe & claw	Male	ADAMS	CAMPB	ANTIP	PROSS
	Female	ADAMS	CAMPB	ANTIP	PROSS
Wing	Male	ADAMS	ANTIP	CAMPB	PROSS
	Female	ADAMS	ANTIP	CAMPB	PROSS
Mass	Male	CAMPB	ADAMS	ANTIP	PROSS
	Female	ADAMS	CAMPB	ANTIP	PROSS

was wrecked on Campbell I in 1828 and was the probable source of Norway rats that overran the island and eliminated snipe from 99.8% of their range (Miskelly 2000). Ironically, snipe persevered on tiny Jacquemart I and outlasted the rats, which were eradicated from Campbell I in 2001. In Feb 2006, 2 snipe were seen on the shores of Perseverance Harbour (Miskelly & Fraser 2006), which is the major geographical feature of Campbell I and was named by Captain Hasselburgh.

DISTRIBUTION, STATUS, BEHAVIOUR AND ECOLOGY

Known only from the Campbell I archipelago, New Zealand subantarctic, where they were caught on 19 ha Jacquemart I (52°37' S 169°08' E) and on Campbell I at the outlet to Six Foot Lake, Monument Harbour (52°36' S 169°09' E) and adjacent to Kirk Stream at the head of Six Foot Lake (52°35' S

169°09' E). Birds were seen but not caught on the northwest shore of Perseverance Harbour (52°33' S 169°08' E) in 2006 (Miskelly & Fraser 2006), and in Dec 2008 and Jan 2009 were seen in the Southeast Harbour catchment of Campbell I (James Fraser & Ian Flux, *pers. comm.*). The total area occupied by Campbell I snipe in 2006 was less than 40 ha, and there were probably fewer than 100 individuals, resulting in a threat ranking of Nationally Critical (Miskelly *et al.* 2008).

Campbell I snipe occurred in densely vegetated habitats dominated by tall tussock grasses (*Poa litorosa*, *P. foliosa*), sedges (*Carex trifida*, *C. appressa*) and fern (*Polystichum vestitum*) growing on damp peat (Barker *et al.* 2005; Miskelly & Fraser 2006).

The 5 recorded breeding events (1 nest and 4 broods of chicks) were estimated to have resulted from layings that occurred between 11 Nov and 11 Jan (Miskelly *et al.* 2006b). The 1 nest found (on 12 Jan 2006) was on the ground under a large *Polystichum* growing among tall *Poa litorosa*, and

Table 4. Leg colour in 4 populations of subantarctic snipe (*Coenocorypha aucklandica*). Figures indicate number of individuals observed with indicated leg colour in each population.

Population	Sex	Grey	Yellow-grey	Pale yellow	Green-yellow	Yellow
Antipodes I <i>meinertzhagenae</i>	Male	7	6			
	Female		1	1		
Port Ross Is <i>aucklandica</i>	Male	3	1	4	1	1
	Female	4	5			
Adams I <i>aucklandica</i>	Male			1	1	8
	Female				1	4
Campbell I <i>perseverance</i>	Male			3		3
	Female			1	3	2

Table 5. Measurements of 5 Campbell I snipe (*Coenocorypha aucklandica perseverance*) chicks captured 9-14 Jan 2006. The sexes of the 3 oldest chicks were determined genetically. Measurements in millimetres apart from mass (grams).

Estimated age (days)	Sex	Culmen	Tarsus	Mid toe & claw	Tail	Wing	Mass
8	-	25.5	22.3	29.9	-	-	32
8	-	23.4	22.3	30.3	-	-	33
20	Male	35.9	23.8	32.4	-	67	54
36	Male	48.8	25.9	33.1	32.9	99	81
37	Female	47.1	26.4	33.4	27.0	97	88

contained 2 fresh eggs (Miskelly *et al.* 2006b). The bowl of narrow *P. litorosa* leaves was 25 mm deep, with an internal diameter of 110 mm (Fig. 3a).

The 6 chicks seen were all accompanied by single adults, and were estimated to be between 8 days old (found 14 Jan 2006) and 50 days old (found 10 Mar 2005) (Miskelly *et al.* 2006b). In addition to 2 single chicks, 2 presumed broods each with 2 chicks were found (11-12 Jan and 14 Jan 2006); in each case the presumed siblings were each accompanied by adults of opposite gender, as confirmed by DNA sexing.

Adult snipe remained among dense vegetation unless flushed by observers or the dog, or if responding to the distress calls of their dependent chick. Vocalisations heard but not recorded included territorial, distress and alarm calls from adults, and contact/distress calls from chicks separated from their parents (Miskelly & Fraser 2006). Most spectacularly, on 14 Jan 2006 at least 3 Campbell I snipe were heard performing nocturnal 'hakawai' aerial displays combining vocal and nonvocal acoustic components (Miskelly *et al.* 2006a).

DISCUSSION

Discovery of an undescribed taxon of living endemic bird was unprecedented in late 20th century New Zealand. There are a few recent examples of previously known populations that have received novel names as a result of new genetic information or critical reappraisal of inadequate type material (e.g. Tennyson *et al.* 2003; Tennyson & Bartle 2005), but the last completely new extant New Zealand bird to be discovered was the Westland petrel *Procellaria westlandica* in 1945 (Falla 1946).

Relationships of the Campbell I snipe

There was good agreement between the external morphology of Campbell I snipe and their genetic relationships (Baker *et al.*, *in press*), with snipe from the Auckland Is, Antipodes I and Campbell I forming a clade distinct from other *Coenocorypha* snipe. Worthy *et al.* (2002) drew similar conclusions based on skeletal measurements and proportions, but did not have access to any bones from Campbell I snipe. All 3 of these subantarctic island groups have similar geological histories (Miocene or Pleistocene basalt volcanoes) and vegetation

Table 6. Recommended taxonomy and nomenclature for the genus *Coenocorypha* (Scolopacidae). In most cases the recommended vernacular name describes the geographic distribution of species and subspecies, but note that the North I snipe was originally described from a specimen collected on Little Barrier I (and is also known as the Little Barrier snipe), the South I snipe was originally described from specimens collected on Jacques Lees I off Stewart I (and is also known as the Stewart I snipe), and that Forbes' snipe was sympatric with the smaller Chatham I snipe. Species marked with † are extinct, and the Fiji snipe, Norfolk I snipe and Forbes' snipe are known solely from subfossil bones.

Scientific name and authority	Vernacular name
<i>Coenocorypha</i> G.R. Gray, 1855	Austral snipes
† <i>Coenocorypha miratropica</i> Worthy, 2003	Fiji snipe
† <i>Coenocorypha</i> undescribed sp.	Norfolk Island snipe
† <i>Coenocorypha barrierensis</i> (Oliver, 1955)	North Island snipe
† <i>Coenocorypha iredalei</i> (Rothschild, 1921)	South Island snipe
† <i>Coenocorypha chathamica</i> (Forbes, 1893)	Forbes' snipe
<i>Coenocorypha pusilla</i> (Buller, 1869)	Chatham Island snipe
<i>Coenocorypha huegeli</i> (Tristram, 1893)	Snares Island snipe
<i>Coenocorypha aucklandica</i> (G.R. Gray, 1845)	Subantarctic snipe
<i>Coenocorypha aucklandica aucklandica</i> (G.R. Gray, 1845)	Auckland Island snipe
<i>Coenocorypha aucklandica meinertzhagenae</i> Rothschild, 1927	Antipodes Island snipe
<i>Coenocorypha aucklandica perseverance</i> Miskelly & Baker, 2009	Campbell Island snipe

(O'Connor 1999). The Auckland Is and Campbell I were glaciated during the Pleistocene ice ages (to 15,000 years ago; O'Connor 1999), but snipe appear to have persisted on the Auckland Is through this time, as *C. aucklandica* was estimated to have been isolated from other *Coenocorypha* snipe for c. 96,000 years, and almost all the genetic variation within *C. aucklandica* is found within the Auckland Is (Baker *et al.*, *in press*). The radiation of *C. aucklandica* to Antipodes and Campbell Is was estimated to have occurred in the last 10,000 years, following the end of Pleistocene glaciation (Fleming 1982; Baker *et al.*, *in press*).

Breeding ecology and behaviour of the Campbell I snipe

The limited knowledge of the breeding ecology of the Campbell I snipe is consistent with what is known for the other populations of *C. aucklandica* (Miskelly *et al.* 2006b), and also for *C. huegeli* and *C. pusilla* (Miskelly 1990, 1999). This includes the 2-egg clutch, large egg size in relation to female body mass, and shared and prolonged parental care with each adult caring for a single chick independent of its mate. The acoustic displays of Campbell I snipe, including nocturnal aerial displays, were also considered identical with those known from other *Coenocorypha* snipe (Miskelly & Fraser 2006; Miskelly *et al.* 2006a).

Taxonomy and nomenclature of *Coenocorypha* snipe

Nine taxa of *Coenocorypha* snipe have been formally described, and 7 of these are here recognised as full species based on plumage (Higgins & Davies 1996), skeletal morphometrics (Worthy *et al.* 2002; Worthy 2003) and genetics (Baker *et al.*, *in press*).

A taxonomy and nomenclature for the genus is proposed in Table 6, including a suggested vernacular name for the genus, and new or supported vernacular names for the species *Coenocorypha miratropica*, *C. barrierensis*, *C. iredalei*, *C. chathamica* and *C. aucklandica*.

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