

# A second intact specimen of the Chatham Island Taiko (*Pterodroma magentae*)

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## ABSTRACT

A breeding male Chatham Island Taiko (*Pterodroma magentae*) was found recently dead of injuries by its burrow on 14 November 1996. Intraspecific fighting followed by sepsis of wounds seems the likely cause of death. All parts were preserved. Food items of Taiko include four squid species and one fish species. Its intestinal structure suggests a close relationship with the *P. mollis* group and *P. macroptera*. Measurements of bones indicate that most subfossil bones previously referred to this species were correctly identified.

**KEYWORDS:** Chatham Island Taiko, *Pterodroma magentae*, study skin, bones, intestines.

## INTRODUCTION

The first specimen of the Chatham Island Taiko (*Pterodroma magentae*) was collected from His Italian Majesty's Ship "Magenta" (hence the alternative name - Magenta Petrel) in the South Pacific Ocean at 39°38' S, 125°58' W on 22 July 1867 (Giglioli & Salvadori 1869). This specimen was prepared as a mounted skin and deposited in the Museum at the Zoology Department of Torino University, Italy (Bourne 1964). Apparently neither its body nor bones (apart from those within the preserved skin) were retained. Photographs of this skin taken in 1992 and sent to MJI show it to be in apparently good condition (Fig. 1).

The postulated connection between the Magenta Petrel and the Chatham Island Taiko (Bourne 1964), known by sub-fossil bones and local lore, was confirmed when Taiko were caught and described on Chatham Island from 1 January 1978 onwards (Crockett 1994). However, because of the species' rarity and highly endangered status, no specimen was collected. [Although Taiko were rediscovered in 1978, the first breeding burrow was not found till 1987 (Imber *et al.* 1994b). Only six breeding burrows are known with fewer than this number of pairs breeding in most years. The total population may be less than 100.] It was considered that, sooner or later, in the course of studies and conservation work on this species, specimens would be obtained through natural or accidental causes. However, 19 years elapsed before the complete specimen reported here was obtained.

Meanwhile, the sparse remains (right wing, sternum and some other feathers) of a probable Taiko were obtained on the southwest coast of Chatham Island on 20 December 1982 (D.E. Crockett pers. comm.), and deposited in the Museum of New Zealand (reg. no. 23019). This bird, with the inner part of the humerus broken off and missing, had probably been killed and eaten by a Feral Cat (*Felis catus*).

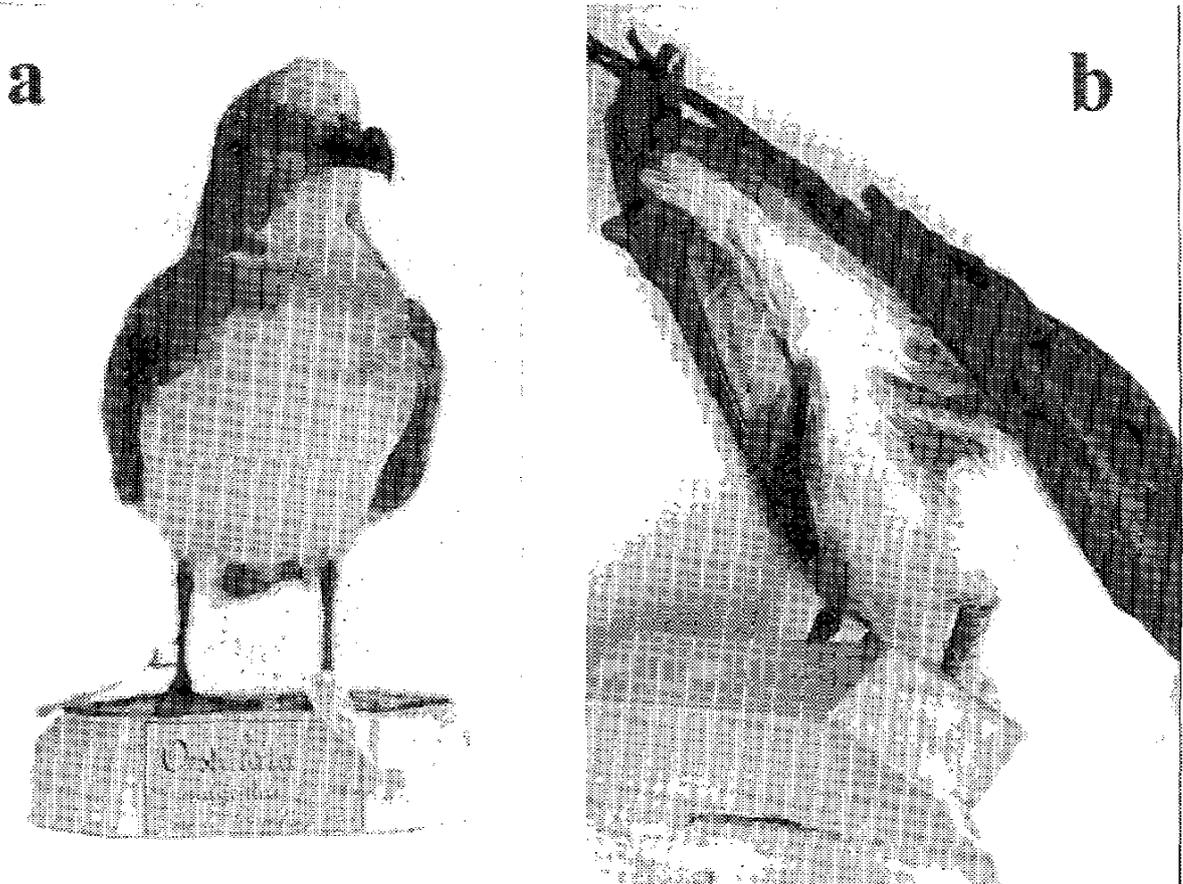


FIGURE 1 – a. Front view of the type specimen of the Magenta Petrel (*Pterodroma magentae*) in the Zoological Museum of the University of Torino, Italy. Note the distinctive shape of the neck band's lower border. b. Rear ventral view of the same skin, showing the white undertail coverts. [Black shaft lines of the longest coverts may not be visible in reproduction here.]

Photos: K. Guldbrandsen

## METHODS

On 14 November 1996 the corpse of one of the pair of Taiko breeding in North 1 burrow was found by PJ, Rex Williams and Peter Ewing about 5 m from the burrow. Fortunately it seemed to have been dead for only about 1-2 days, so was suitable to be prepared as a study skin, and to be examined internally. It was frozen within two hours of discovery, taken to the Museum of New Zealand Te Papa Tongarewa in December, and processed in March 1997.

This bird was presumably one of the pair that had bred successfully (in seven of the previous nine breeding seasons) since discovery of the burrow in April 1988 (Imber *et al.* 1994a,b). Its burrow is an isolated breeding burrow situated 4 km north of the other known burrows, which are scattered within an area of radius about 1 km. It was first caught at the burrow, with its mate, on 2 October 1990, banded and measured (Taylor 1991, see below). It was recaptured there on 22 April 1995, when visiting its last offspring, and again on 6 October 1996, when a blood sample was obtained from it.

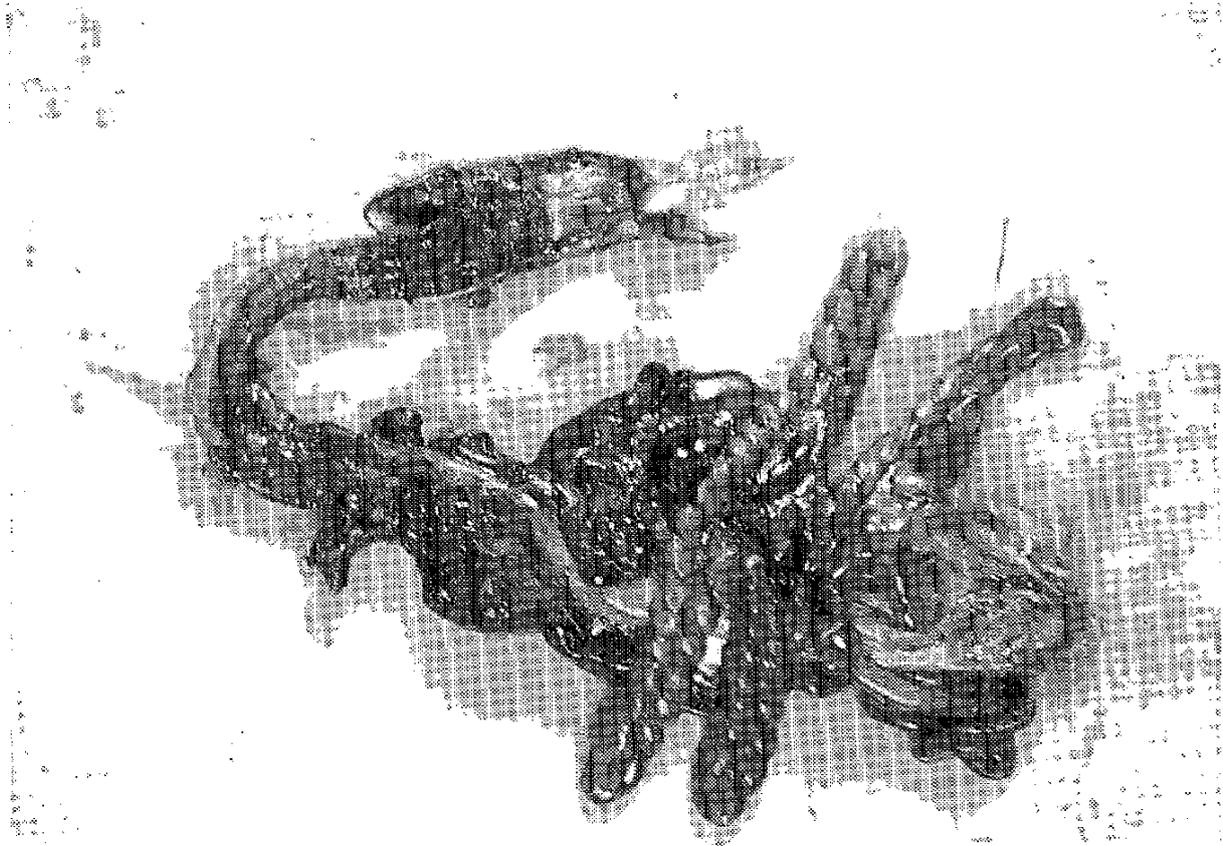


FIGURE 2 – Digestive tract and abdominal contents of Taiko (Museum of New Zealand reg. no. 25209) showing the helicoidally-twisted upper intestines.

On 6 March 1997 the bird was skinned by Noel Hyde, the Museum's bird taxidermist in the presence of MJI, AJDT and GAT. The skin was removed, washed and dried. Before preserving as a study skin (reg. no. 25209), the left wing was removed and preserved in the fully-open position. The humerus, radius, ulna and carpometacarpus were removed from that wing; the entire left leg and all bones removed from the body were skeletonized for the osteological collection. The cranium (but not the maxilla or mandible) was removed from the head. A cranium of a White-headed Petrel (*Pterodroma lessonii*) from Antipodes Island was used as a replacement to preserve the shape of the head in the study skin.

Phthirapteran lice were collected from the corpse. These were preserved in the Museum's entomological collection by R.L. Palma. Lice had also been collected from this bird when alive. A separate paper is being prepared on all Phthiraptera collected from Taiko (Palma & Imber unpubl.).

A photograph (Fig. 2) was taken of the digestive tract and abdominal contents. Small tissue samples of heart, liver, kidney, lungs, intestine and fat have been kept frozen. The rest of the viscera, muscle, fat and other soft tissues were preserved in ethyl alcohol.

## RESULTS

### Condition of specimen

There were large masses of small maggots under the skin in the lower abdomen and on the right shoulder. The tissue was darkened in these areas, which may have been from bruising prior to death or as a result of damage by the maggots. Blood stained the tail and feathers around the vent. Once clean and dry, the skin and plumage were thoroughly inspected. There was a 5 x 6 mm hole to the left of the cloaca and another hole 13 x 10 mm on the lower flank plus a 20 x 14 mm hole on the left hand side of the lower rump. The holes were surrounded by bare skin. The damage on the upper right shoulder and base of the right wing was more extensive and included a bare patch of skin of 68 x 48 mm. The exposed skin was peppered with small holes and one large hole 14 x 18 mm in size. The bill had freshly broken plates on both sides of the mandibular rami (lower mandible).

No damaged skin was present elsewhere. The legs were undamaged. The bird had a small amount of sub-cutaneous fat and breast tissue was still well formed; i.e., the bird had not starved. There was also a small residue of food in the proventriculus. There were no maggots in the cloaca or in the bird's throat. The skull and head showed no evidence of subcutaneous injury. No bones were broken. All internal organs were intact and appeared undamaged.

Only a small number of phthirapteran lice were found on the corpse. This usually indicates that a bird has been in good health until the events leading to its death (R.L. Palma pers. comm.).

### Moult

Most plumage was fresh or only slightly worn, but some upper wing coverts were worn and there was active moult of the back feathers. All primaries, secondaries and rectrices were new.

### Internal organs (Fig. 2) and food items

The bird was a male; its testes were round, black and each measured 4-5 mm in diameter.

The upper intestines were helicoidally twisted (cf. Imber 1985), with 60 left-handed twists.

The proventriculus was empty but for some paste apparently derived from fish. The gizzard contained some residual food items and the only identifiable item of food: a cephalopod beak of a juvenile *Nototodarus* sp. As there is nothing published on the food of Taiko, we include this collation of data on all other food items collected to the present.

Cephalopoda: 1 *Brachioteuthis* sp. (beaks) regurgitated by a non-breeder, November 1993;

1 *Gonatus antarcticus* (lower beak) at the entrance of North 1 burrow, November 1996;

1 *Teuthowenia pellucida* (beaks, some flesh) regurgitated at South 10 burrow, February 1995.

Fish: 1 *Sio nordenskjoldii* (otoliths, some flesh) regurgitated at South 10 burrow, February 1997.

### Measurements

The following measurements (mm) were taken on 3 July 1998. Dimensions in brackets are those taken when the bird was alive on 2 October 1990 (Taylor 1991). The culmen was measured from the tip to the anteriormost feathers above the nostrils, and bill depth at the same posterior point of the culmen measurement. The wing measurement was taken with the outer wing flattened.

Culmen	32.1	(32.6)	Bill depth	16.3	(16.9)
Tarsus	41.5	(42.2)	Mid-toe and claw	58.5	(57.1)
Wing	300	(300)	Tail	129	(128)
Mass (g)	c.460 - in frozen state, December 1996 (435)				

The maximum length of the specimen's bones, and of some bones of the 1982 remains, are compared with those of sub-fossil bones from the Chatham Islands attributed to Taiko by Bourne (1967) (in brackets). Total head length was measured before the cranium and maxilla were separated and includes the unguinal plate's thickness, whereas Bourne's measurements would have excluded this plate.

Total head length	84.4	(84-91)			
Cranium	47.2	(45-48)	Sternum	60.4, 59.2	(56-59)
Coracoid	35.6, 33.6	(29-34)	Humerus	103.7	(95-109)
Ulna	106.9,	106.7 (-)	Radius	105, 104.4	(-)
Carpometacarpus	50.3	(-)	Femur	37.1	(33-40)
Tibiotarsus	74.4	(73-80)	Tarsometatarsus	41.1	(-)

## DISCUSSION

### Cause of death

The small size of the maggots on the corpse, the slightly pinkish colour in the throat and the condition of the viscera suggest that the bird died no more than 1-2 days before discovery.

Blood stains on the feathers adjacent to wounds on the back and near the vent, suggest that the injuries were made before the bird died. The final cause of death was probably sepsis in these wounds.

What caused the injuries can only be speculated. We think it is safe to eliminate Feral Cat as the bird's head should have shown canine holes and damage to the neck and skull (Imber 1987). Weka (*Gallirallus australis*) usually strike at the head and nape when attacking petrels (pers. obs.), so the lack of injuries there (except to the bill plates) makes Weka less likely as a cause. Neither rats (*Rattus* spp.) nor Possum (*Trichosurus vulpecula*) seem likely to have caused the injuries. If any predator caused the injuries, then it is surprising that the corpse was not more or less eaten subsequently.

A fight with another male Taiko is thought the most likely cause of the injuries. In the Snow Petrel (*Pagodroma nivea*), Brown (1966) describes fighting between males in which they grappled bills, the bird locking onto his opponent's lower mandible invariably winning. Identical fights have been observed in male Grey-faced Petrels (*Pterodroma macroptera gouldi*) (MJI, AJDT, GAT pers. obs.), with other males seen with damaged bills, especially lower mandibles. Subsequently, victorious Snow Petrels were observed to chase and grasp the flanks of the loser, leading to further fighting which could be prolonged. Such fights have led to death in Grey-faced Petrels and Cook's Petrels (*P. cookii*) (pers. obs.). The damage to the Taiko's lower mandible (suggesting it was the loser) and injuries to the flank area are consistent with such a hypothesis. It may be noted that this male was relatively small (most male Taiko weigh nearer 500 g), with a small bill also, and could have been thus disadvantaged in a fight. The injury at the wing base may have prevented its departure to sea after eviction, where it could have cleaned its wounds and escaped blow-flies.

The persistent visits to its burrow during the month after its death may have been by this other male, but why visits ceased (none since early December 1996) is curious. As no egg was laid there in 1996, despite the male having been present at mating time in early October, and no chick reared the previous year (so no reason for the female not to return if alive), it seems that his mate, with whom he had apparently reared at least seven chicks, was already dead.

### **Subfossil and recent bones from Chatham Island**

Comparisons of bone measurements of this specimen with those of putative *P. magentae* subfossils measured by Bourne (1967), indicate that most of the bones were correctly attributed to Taiko by Bourne. However, some of his coracoid and sternum measurements are smaller and may not all be Taiko. The remains of the suspected Taiko found in 1982 are now confirmed as that species using bone measurements. Further work is in progress on collections of subfossil bones from the Chatham Islands (AJDT pers. comm.).

### **Relationships of Taiko as shown by the intestines**

Helicoidally twisted upper intestines (Fig. 2) with 93 to 100% of twists left-handed (Table 1) are characteristic of subgenus *Pterodroma* petrels as defined by Imber (1985), which includes all species in Table 1 and others. Thus, this Taiko's intestinal structure is consistent with its currently accepted taxonomic placement (Turbott 1990). The number of helicoidal twists in this Taiko places it close, not only to *P. macroptera* with which it is usually associated (Bourne 1964, Turbott 1990), but also to the Soft-plumaged Petrel (*P. mollis*) and its close relatives, Madeira Petrel (*P. madeira*), Desertas Petrel (*P. deserta*) and Cahow (*P. cabow*), with which it shares other features (Imber 1985).

As summer breeders on islands at or near the southern subtropical convergence, Taiko and Soft-plumaged Petrel occupy similar ecological niches. Given the abundance of the Soft-plumaged Petrel in the southern Atlantic and Indian Oceans, its former absence from the southern Pacific Ocean is notable, but possibly due to Taiko occupying its ecological niche there. The present and ongoing expansion of

TABLE 1 – Number of helicoidal twists, and percentage of left-handed twists, in the upper intestines of Taiko and closely related species of *Pterodroma*. Data for all but Taiko, Desertas Petrel and one Grey-faced Petrel from Imber (1985).

Species	No. of specimens	No. of intestinal twists	% left-hand twists
Taiko ( <i>P. magentae</i> )	1	60	100
Soft-plumaged Petrel ( <i>P. mollis</i> )	2	60-61	93-100
Madeira Petrel ( <i>P. madeira</i> )	1	44+	c.100
Desertas Petrel ( <i>P. deserta</i> )	1	68	100
Cahow ( <i>P. cabow</i> )	1	64	95
Grey-faced Petrel ( <i>P. macroptera gouldi</i> )	4	61-80 mean=70	93-95
White-headed Petrel ( <i>P. lessoni</i> )	1	88	94

the Soft-plumaged Petrel colonies on Antipodes Island (Imber unpubl.), first discovered in 1969 (Warham & Bell 1979), may be a consequence of the demise of the vast Chatham Island population of Taiko. Both Taiko, feeding southwards from Chatham Island (Imber et al. 1994b) and Soft-plumaged Petrels, ranging northwards from Antipodes Island (pers. obs.), feed in the same marine zone, mainly between 44°S and 50°S.

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