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PENGUIN FLIPPER-BANDS USED BY THE USARP* BIRD-BANDING PROGRAM 1958-60.

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Flipper-bands were designed for Adelie, *Pygoscelis adeliae*, and Gentoo, *P. papua*, Penguins in 1948 (color bands) and 1949 (aluminum) (Sladen, 1952: 543) and have since been used extensively on other species, with varying success, by British, French and Australian Antarctic expeditions. These bands have several advantages over bands placed around the tarsus (Richdale, 1951), or around the feathered tibia, but they require very careful fitting. Some of the problems of this technique have been discussed by Gwynn (1955), Austin (1957), and Sladen & Tickell (1958).

The bands described here were designed for the USARP Bird-banding Program**, and are being used by U. S. and New Zealand biologists in studies now being conducted in the Antarctic on population dynamics, behavior, orientation, navigation and physiology of penguins.

Both of us travelled on *U.S.S. Staten Island* during the summer season of Operation Deep Freeze IV, 1958-9. Penney left the ship in February to winter-over at Wilkes Station (66° 15′ S., 110° 31′ E.), and reports here on the success of the 1958 Adelie flipper-band design.

For Emperor Penguins *(Aptenodytes forsteri)*

As the size of the flipper varies more in Emperor Penguins than in Adelies, bands must be used on Emperor flippers with much care, and fitted exactly. More trials are needed before they are used in large numbers.

In the two designs described, the reference number lies on the outer face of the flipper, so that it can be read without handling the bird. Most of the address is hidden in the axilla.

Footnote:— *=United States Antarctic Research Program
Footnote:— **This program started in December 1958, is in collaboration with the U. S. Fish & Wildlife Service and supported by the National Science Foundation (N.S.F. G6327 & G9990).

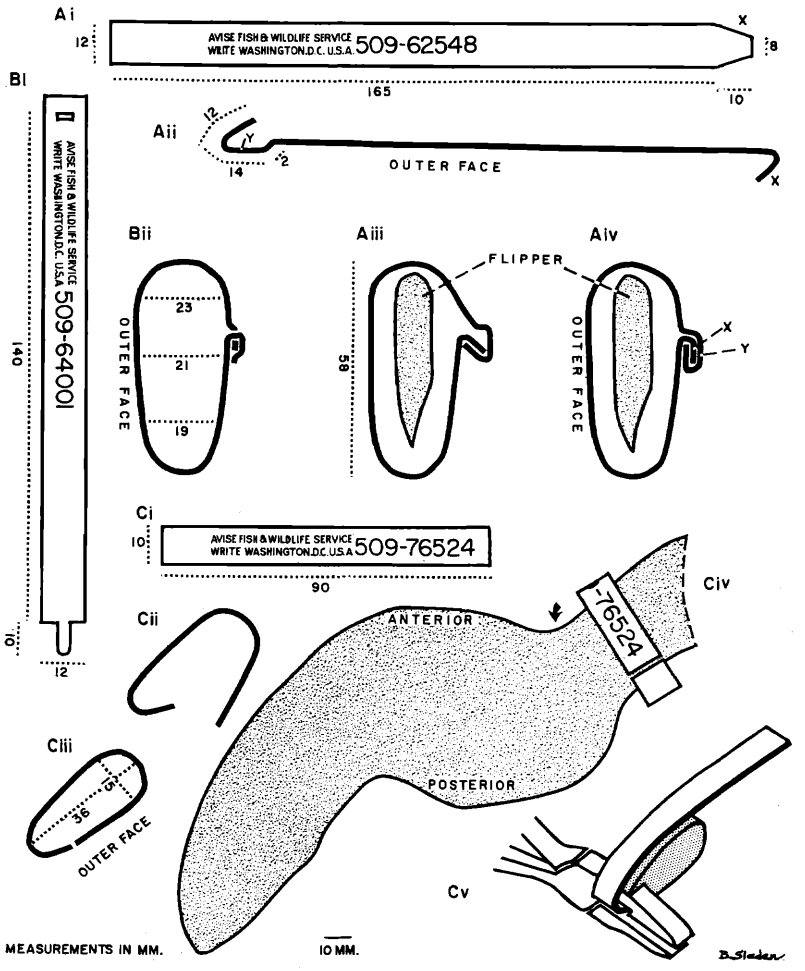

Figure 1. *USARP Penguin-flipper bands*

A 1958 design for Emperor Penguin. (i) first shaping. (ii) second shaping. (iii) shaped around flipper. (iv) final position.

B 1959 design for Emperor Penguin. (i) strip as supplied. (ii) final position around flipper.

C 1958 & 1959 designs for Adelie & Chinstrap Penguins. (i) the strip supplied in 1958, cut to correct length. (ii) the pre-shaped band supplied in 1959. (iii-iv) final position around flipper. Comment on the arrow is in text. (v) pliers for shaping strips. Shows strip partly shaped.

A. *1958 design* (see figure)

Metal: 3SH12 Aluminum, gauge 0.050 inch. Made in the field from strips 25 cms. long and 12 mm. wide.

This design was based on a clip-type previously used for Adelie Penguins (Sladen 1958; Sladen & Tickell 1958,7). One end, "X", of the strip is trimmed on either side (see Ai) so that

when the clip is finally squeezed together (Aiii & iv) with the pliers, the edge marked "Y" is crimped over into the spaces left by the trimming. "X" is thus enclosed from the sides and is prevented from slipping sideways.

This design was developed at a newly-discovered Emperor rookery off Coulman Island (73° 21′ S., 170° 40′ E.), Victoria Land, to which we were transported by the *Staten Island* helicopter. 51 adults and 49 chicks were banded here. After some experience, we found that the enormous adults were not difficult to band, though the process was slow, and padded trousers were needed. The penguin was caught by the neck and, while still standing, its head and neck were thrust firmly between the knees of the holder, with the bird's back away from him. A second person then placed the band on the flipper. Some birds retaliated by pounding the holder's shins with their flippers; others, especially the young, remained quiet, making it possible for one person to do the banding himself.

B. *1959 design* (see figure)

Metal: 3SH14 Aluminum, 0.050 inch gauge, 12 mm. wide.

The 1958 design was changed because the clip is too complicated for general use and apparently can be forced apart by ice (see Sladen & Tickell, 1958, 12). The simple device of tongue and slot of the 1959 design is adequately described in the figure. It is being used during the 1959-60 season.

For Adelie and Chinstrap Penguins *(Pygoscelis adeliae* and *P. antarctica)*

C. *1958 and 1959 designs* (see figure)

Metal: 52SH12 Aluminum (1958 design) and 5052H32 Aluminum (1959 design), and both 0.064 inch gauge and 10 mm. wide.

Improvements on old designs suggested previously (Sladen & Tickell, 1958, 12) were considered in developing these bands. Making them of tough metals (the 1959 band is slightly tougher), enables them to be of the butt-end type, that is, without over-lap or locking device. They are therefore very simple to use. When the band is in place, the five-figure reference number can be read through binoculars from a distance of 60 feet.

The 1959 band is pre-shaped in the factory; the 1958 one is distributed as a strip (Ci) to be shaped in the field. Penney made a pair of pliers for the shaping, on one jaw of which is welded a piece of iron filed into a mold for the band. The end of the strip carrying the address is gripped by the whole width of the jaw, and the strip bent around the mold (see Cv), and adusted so that the ends meet squarely. Shaping takes about 7 seconds. Before the band is closed on the flipper, it is important to try to pull the band off distally to see if it will restrict the movement of the joint, or come off. 4% of the bands of the 1958 and 1959 designs will do this and must be replaced by smaller ones. Opening and closing of the band more than once weakens it, so must be avoided.

Four Chinstrap Penguins, which take the same size of band as the Adelies, were banded on Sabrina Islet (66° 55′ S., 163° 20′ E.), Balleny Islands, on 27 January, 1959. This species was a new discovery for this part of the Antarctic (Sladen, in press).

Nearly 1700 Adelies were banded from the *Staten Island* and at Wilkes Station during the 1958-9 season. At Wilkes, 459 of them were adult birds, and of these, 266 (58%) were found at the same rookeries during the next breeding season. No injuries were seen. A 58% recapture of banded adult Adelies may not be high when one expects breeders that are well established to return to the same or nearby nest-sites (Sladen, 1958: 70). But banding at Wilkes began at the end of the season, and the breeding status of the adults could not be determined. However, 74 were feeding chicks and 55 of these were recaptured (74%). 87 others were occupying nest-sites and 67 of these were recaptured (77%). Between banding and recapture, the birds had molted and spent a winter at sea. So, with allowances for some deaths from usual causes, and some scattering of unestablished birds to the numerous other rookeries nearby, these may be very good rates of survival. Four of the 266 Adelies recaptured at Wilkes had partly-opened bands, but we believe the tougher metal of the 1959 band will stop this. As with other flipper-bands, there is slight wearing of the feathers along a few mm. of the anterior border of the flipper (at the point marked by the arrow in Civ), but this does not harm the bird. It can be almost eliminated by grinding down the square edge of the band at this part, and by reducing the interior length of the band from 36 mm. (see Ciii) at 34 mm.

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