This young bird, deserted by his parents (N70 and N71) in December 1959, was found starving when 21 days old, removed from his nest and taken to be reared in captivity among cats and dogs.

a At the fledgling stage.

b At the juvenile stage.
PLATE II

BURROWS AT THE NECK STUDY AREA

a  A typical burrow 1.5m deep, with a row of closely spaced bracken stalks placed across the entrance to ensure that any entry could immediately be detected.

b  A shallow burrow recently formed by the occupant scooping out a hollow for a night roost.
PLATE III

A BANDED ADULT MALE, Ni:13

This bird, an unsuccessful breeder in 1961-62, was captured at night when arriving for the moult on 7.11.62, then placed in a cage to be examined, weighed and photographed daily (see Plates XIV-XVI). The photograph was taken at noon on 8.11.62. (Day 1).
a Two banded sibling chicks kiss-preening. The photograph, taken inside one of the laboratory tents on 31.1.62, when they were 53 and 54 days old respectively, shows the right flipper band and right leg band (single, wide, light blue) of one chick, NC39, and the left leg band (single, wide, red) of the other, NC48. See Figure 4.54 and Table 7.62.

b The second laboratory tent, erected in a hollow so that a group of burrows situated just below and south east of the main dune within the study area could be observed at night. This photograph shows Isthmus Bay beyond the ridge extending south of the dune.
PLATE V

TECHNIQUES OF BANDING AND MEASURING

a A flipper band being applied to the right flipper of an adult penguin (E28) which is still partly inside a cloth bag. A second penguin (also to be banded, weighed and measured) is within the second cloth bag. The circlip pliers, lying on the gloves, are used to open the bands and the multigrip pliers (in operation) to close them.

b Measuring the length of the bill of an adult penguin (N102) from the tip of the exposed culmen to the base on the dorsal side.
PLATE VI

TECHNIQUES OF MEASURING AND WEIGHING

a Measuring the flipper of a chick (NA1) from the axilla to the tip. The callipers have been lifted slightly to facilitate reading and the flipper is no longer fully outstretched.

b A penguin chick (KO) on the scales just after the recording of his weight when 5 days old.
PLATE VII

AERIAL SURVEY PHOTOGRAPH OF THE NECK STUDY AREA (1963)

By courtesy of the Tasmanian Government Lands Department.
PLATE VIII

VIEWS OF THE NECK STUDY AREA

a Looking southwards from the Trig. point, showing the dividing ridge leading to the summit of the main dune within the study area, the north east slopes, the north east flats (in the left foreground) with tracks leading in from the north east ascending place; also a portion of the upper north west slopes, partly bare and honeycombed with burrows, contrasting with the scrub-covered far north west slopes (in the right foreground). The tent was erected on the north east flats, midway along the base of the dividing ridge.

b Looking northwards from the main dune within the study area, showing the dividing ridge leading up to the highest dune with the Trig. point and showing the north slopes in the foreground.
PLATE IX

AERIAL SURVEY PHOTOGRAPH OF THE BORONIA STUDY AREA (1969)

By courtesy of the Tasmanian Government Lands Department.
PLATE X

VIEWS OF THE BORONIA STUDY AREA

a Looking southwards, showing most of the small sandy beach and part of the mudstone platform at the base of the cliffs.

b Looking northwards, showing the rocky shore and boulders beyond the sandy beach.
PLATE XI

SITES OF NESTING AND ROOSTING PLACES AT BORONIA

a A female (K3) incubating two eggs in a shallow crevice at the base of the cliffs.

b A female (K9) just extracted from beneath two boulders in the foreground.
PLATE XII

AERIAL SURVEY PHOTOGRAPH OF THE TARONGA STUDY AREA (1969)

By courtesy of the Tasmanian Government Lands Department.
SEXING BY THE METHOD OF CLOACAL EXAMINATION OF BREEDING PAIRS

a The cloaca of the female breeding bird (N59) at oviposition.

b The cloaca of the male breeding bird (N102) with which N59 was observed copulating and regularly sharing the duty of incubation.
The opening up process until the shedding of the first feathers. This bird was photographed at noon each day from 8.ii.62 to 27.ii.62 (see Plate III for Day 1).

a Day 4 (11.ii.62)
The old feathers still lie flat and feel stiff except on the head and neck, where the new feathers are just breaking through the skin, each within its sheath and attached to the base of the corresponding old feather.

b Day 5 (12.ii.62)
The old feathers no longer lie flat on the back, neck and crown. The new feathers are well through up to 3mm long in the middle of the back, carrying the old feathers up on their tips.

c Day 7 (14.ii.62)
The old feathers are opening and becoming slightly untidy, even on the abdomen. Three have been shed. The new feathers are up to 11.5mm long in the middle of the back.

d Day 8 (15.ii.62)
The old feathers are all well open and appear untidy, since they no longer all face in the same direction. The new feathers are up to 14.5mm long in the middle of the back. Tiny clear patches are appearing on the nape of the neck. The skin of the flippers is becoming scaly.
MIDDLE STAGES IN THE MOULT OF THE MALE N113

The shedding of most of the old feathers.

a Day 9 (16.ii.62)
The old feathers are well open, very untidy, loose and easily dislodged. Small clear patches are developing on the neck and the abdomen. The new feathers on the nape are still short and remain within their sheaths. The skin of the flippers is very scaly.

b Day 12 (19.ii.62)
A clear patch extends in a ring around the neck. The new feathers here are still short but have lost their sheaths. The lower abdomen is clear of old feathers. Tiny clear patches are appearing on the back. The skin of the flippers is becoming loose.

c Day 13 (20.ii.62)
Large patches are clear of old feathers on the abdomen, legs and neck and small patches are clear on the crown, face and back. The new feathers are still short on the neck.

d Day 14 (21.ii.62)
The cleared areas are enlarging on the abdomen, legs, back, neck and head. At the posterior edge of the flippers the skin, with the old feathers still attached, is starting to peel.
LATE STAGES IN THE MOULT OF THE MALE

The shedding of the last old feathers.

a Day 15 (22.ii.62)
The old feathers are still thick on the nose, throat, shoulders and flanks. At the anterior as well as the posterior edge of the flippers, the skin is starting to peel. The skin of the nose is also peeling.

b Day 16 (23.ii.62)
Groups of old feathers remain on the forehead, chin, shoulders, legs, lower abdomen and flippers. A few single old feathers are left on the back and head.

c Day 18 (25.ii.62)
Only a few old feathers remain on the nose, back, shoulders and right flipper. The new feathers are very dark blue and uniform in colour.

d Day 20 (27.ii.62)
The moult is complete, no old feathers are left and only a few scaly sheaths are still adhering to the new feathers which are now full length. A lighter blue colour is developing on the barbs of the new feathers on the crown and shoulders.
### GET TO ABBREVIATIONS USED IN TABLES AND FIGURES

The symbols 'a' and 'g' have been used to distinguish male and female birds except in a few tables and diagrams, where, as indicated in the accompanying legends, to ensure clarity the letters 'm' and 'f' have been employed.

### Stages of Chick Development

**I Primary Down Only**

| IA | Eyes shut, unable to support head |
|    | opening, beginning to hold head up |

**II Development of Secondary Down**

| IA | Points showing down on head region |
|    | " " upper neck, posterior flippers |
| IC | " " shoulders |
| ID | " " lower neck |
| IH | " " upper neck and posterior flippers |
| IF | " " crown and flippers |
| IG | " " forehead and anterior flippers |
| IH | " " nose |

**III Secondary down becoming thicker, eyes opening; color, no blue feathers yet appearing**

| IIA | Blue feathers appearing tail |
| IIB | " " upper tail, sides |
| IIC | " " head, lower back, abdomen and flippers |
| IID | " " only tail feathers |

**III Development of Adult Plumage and Loss of Down**

| IIA | Blue feathers appearing tail |
| IIB | " " upper tail, sides |
| IIC | " " head, lower back, abdomen and flippers |
| IID | " " only tail feathers |

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**Legend**

- Chicks reared to the age of at least 5 weeks and banded
- Not attended after 0-5 weeks, not banded
- Adopted individually
- Departed successfully, minimum departure weight forms a provisionally mixed sex; 900g
- Departed, recovered dead shortly after entering sex
- Fostered by alien parents
- Chicks killed by own parent
- Lost after human interference
- Missing before fully fledged, or when fledged but below minimum successful departure weight
- Recovered dead
- Substituted for a bailed egg or a dead chick in another nest
- Starving, removed (taken to be reared in captivity)
- Temporarily presumed dead
- Sexing to the East
- Displaying inside nest or roosting place by day or night
- Mating to the West
- Order of laying in any one nest, not necessarily by the same female
- Order of laying by any one female, not necessarily in the same nest
- Egg(s) Broken
- Egg(s) Hatching
- Egg(s) Missing
- Abandoned, formerly buried
- Failed in Breeding
- Twice in one season

**Gender**

- Sexed "A" males, "C" females
- Sexed "a" males, "c" females
- Sexed "O" males, "o" females
- Sexed "a" males, "c" females
- Sexed "m" males, "f" females
- Sexed "g" males, "l" females

**Stage**

- Ascending
- Descending
- Metastasis
- Having
- Lane
- Outside
- Post-Natal
- Post-Implantation
- Post-Chick period
- Post-
- Pre-
- Post-
- Primary
- Secondary
- Post-
- A
- B
- C
- D
- E
- F
- H
- J
- K
- L
- M
- N
- O
- P
- Q
- R
- S
- T
- U
- V
- W
- X
- Y
- Z

**Breed**

- Died on mating
- Died on dead birds
- Died on "an
- Died on "and"
- Died on "is"