

## A Method of Sexing Petrels in Field Observations

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Most Procellariiformes exhibit no external sexual dimorphism and hence distinguishing the sexes has been a serious problem to most workers in life history studies. Ornithologists have met the situation in various ways.

Richdale (1949, 128; 1950, 13), working with albatrosses, depended on the behaviour of individuals in the pre-egg stage for sex diagnosis, and the manner in which he used the evidence would give reliable results. For nocturnal burrowing petrels, however, the necessary observations are very rarely practicable. Lockley (1942, 26), in his classic studies on the Manx Shearwater (*Puffinus puffinus*) at Skokholm, determined the sexes in his breeding colony on the basis that "the bird found with the new-laid egg would be the hen". This method, if applied to the Australian Short-tailed Shearwater (*Puffinus tenuirostris*) would give accurate results only about three times in four, as some females quit the burrow the same night as the egg is laid, leaving the male incubating. The drastic resort of Roberts (1940, 155), in killing and dissecting one of the parents at the termination of his study of Wilson's Storm-Petrel (*Oceanites oceanicus*), whilst decisive, is, of course, undesirable in many types of long-term investigation.

The form of the cloaca, so well-known in commercial chick sexing, has been proposed for wild bird studies also—*cf.* Mason (1938, 299); Hochbaum (1942, 299); Wolfson (1952, 159). These methods require a knowledge of minute differences in the cloaca, which vary from species to species, and in some cases, as in commercial chick sexing and in the Anatidae, involve some physical manipulation of the cloaca to reveal the criteria sought.

However, we have found in our work on *Puffinus tenuirostris* that the sex can be readily determined by a superficial inspection of the cloaca, not dependent on any skilled knowledge of anatomical details. Unfortunately, the method is only applicable to the period of sexual activity, but as an individual may be sexed by this means during a period of some two months, and that during the crucial part of its stay on the nesting islands, the technique should be of value to field workers. The basis of the differences between the sexes simply lies in the great dilatation of the cloaca in the female, associated with the swelling of the oviduct, to allow for the passage of the disproportionately large egg.

*Puffinus tenuirostris* lays an egg which is some 16 per cent. of the body weight of the parent and has a mean width

of 47.7 mm. and varies from 43.5 to 50.3 mm. The laying of this huge egg has necessitated temporary, but conspicuous, physical changes in the form of the cloaca.

Egg-laying in this species takes place from about November 19 or 21 to December 2 or 3, and it is within this period that the characteristics are most pronounced. The cloaca in the female becomes transversely distended, with swollen lips, measuring some 22 mm. by 14 mm., and with the actual slit about 11 mm. wide (fig.), the epithelium being red and raw, and sometimes bleeding. In male birds, as in non-breeding females, the cloacal opening is small and inconspicuous, with the vent roundish or feebly transverse.

The enlargement in breeding females begins some time before egg laying actually takes place. In mid-October some individuals show the roundish vent tending to become slightly transverse, the lips thickening and distending, external indications that the oviduct is beginning to swell at the same time. In early November there is no difficulty in recognizing females and just prior to actual egg-laying the cloaca will have reached its maximum size. In such cases the unlaidd egg may be felt as a hard protuberance in the bird's abdomen.

The relapse of the cloaca to its normal form takes place gradually, but some semblance of its characteristically female form can usually be recognized until towards the end of December and in some individuals until early January. By the time of egg-hatching, from mid-January onwards, females may barely, if at all, be distinguished from males.

This method of distinguishing between the sexes of breeding 'mutton-birds' is well-known to the commercial 'birders' of the Furneaux Group in Tasmania, particularly the Cape Barren Islanders, as first reported by C. F. Cole (1913, 511). However, the significance of Cole's information appears never to have been appreciated by students of petrel life histories.

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