

## Preliminary observations on ovarian activity and sexual maturity in female Peale's dolphin (*Lagenorhynchus australis*)

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### Abstract

Some preliminary analyses of the reproductive parameters of *Lagenorhynchus australis* from Southern Argentina were based on anatomical and histological features of gonads from accidentally captured females. One, 185 cm long, was immature; a second, 193 cm long, was at the onset of puberty; the third, 210 cm long, was a mature female which appeared to have had a minimum of 8 pregnancies. Three types of ovulation scars, associated with three different types of corpora, are described. It is possible that *L. australis* is larger at the time of sexual maturity than *L. obliquidens*.

### Introduction

Very little is known about the biology of Peale's dolphin (*L. australis*). Remarkably, no reports about its reproductive biology appear in the literature (Kellogg, 1941). Although it is frequently observed in the coastal waters of Southern Argentina and Chile, and accidental capture occurs in fishing nets (Goodall & Cameron, 1980) no specimens have previously been obtained for detailed observation on the gonads and reproductive condition.

In this work we report some preliminary data on ovarian activity and sexual maturity in three female specimens of *L. australis*.

### Materials and Methods

Three female specimens of *L. australis* were accidentally captured in fishing nets at 45°25'S, 65°50'W off the coast of Santa Cruz, Argentina, on 15 September 1989. The animals were immediately frozen at -33°C and necropsies were performed 20 days later.

The ovaries were measured and photographed and then sliced transversely at intervals of 5 mm for visual examination of ovarian structure.

Histological analysis of the gonads was made by staining 5 µ thick sections with haematoxylin and

eosin or Masson's trichrome. Gross inspections were made of the uterus and mammary glands in order to detect pregnancy or lactation.

### Results

Gross inspection revealed no signs of pregnancy or lactation in the uterus or mammary glands. Table 1 summarizes the data for the animals and their ovaries.

#### *Gross inspection of the gonads*

The ovaries were roughly elliptical in shape and broadly similar in size (Table 1). Specimen 001 was the only one which exhibited ovulation scars on the ovaries with a distinct left-handed functional polarity (15 scars on the left ovary and 2 on the right). Three types of superficial scar were distinguished according to their morphological appearance (Fig. 1):

Type 1—Rounded smooth elevations with depressed centres,

Type 2—Rounded elevations with folds separated by furrows resembling brain convolutions,

Type 3—Small depressions with radiating furrows.

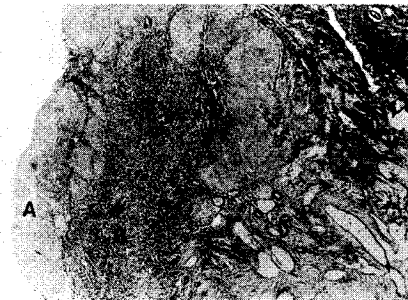
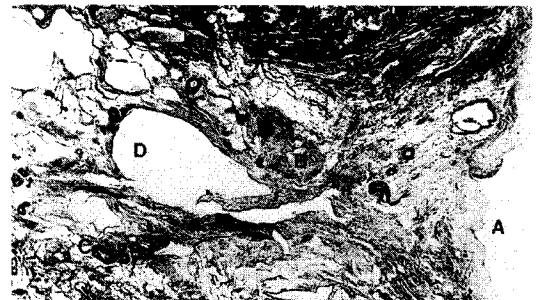
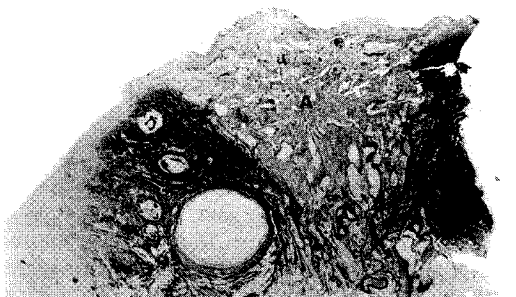
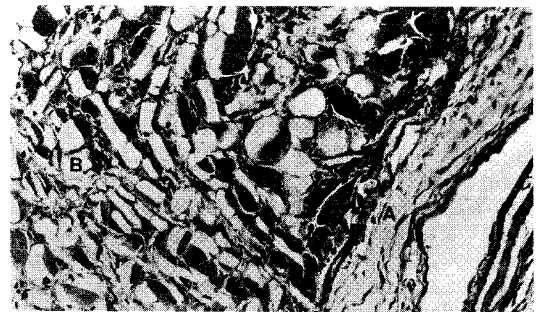
#### *Histological observations*

In spite of the presence of artefacts caused by freezing, cytological detail was preserved well enough for worthwhile descriptions of the fine structures of the corpora and other ovarian tissues.

In the left ovary of specimen 001, the corpora associated with type 1 scars (2 in total) appeared as rounded or irregular masses, 5 mm in diameter, with two well defined zones, an outer folded zone of hyalinized connective tissue and a central zone filled almost completely with degenerating luteal cells with yellowish cytoplasmic pigment (Fig. 2). Type 2 ovarian scars (8 in total) appeared as bigger masses up to 10 mm in diameter which often occupied the total thickness of the ovarian cortex. They were mainly composed of hyalinized connective tissue with a radial arrangement which seemed to be caused

**Table 1.** Body length and ovarian weight and measurements, functioning corpora lutea and scars of ovulation in three female *L. australis*

	Animal number		
	001	002	003
Length cm	210	193	185
Ovarian weight gm	100	115	109
Ovarian dimensions mm			
Right	49 × 8 × 14	46 × 14 × 11	38 × 14 × 7
Left	55 × 22 × 18	45 × 21 × 9	36 × 19 × 6
Number of functioning corpora lutea			
Right	0	0	0
Left	0	1	0
Number of scars of ovulation			
Right	2	0	0
Left	15	0	0

**Figure 1.** Superficial scars in ovaries of *Lagenorhynchus australis*.**Figure 2.** Corpus type 1 in specimen No. 1. Outer zone of fibrous tissue (A) and inner zone of pigmented cells (B). H/E × 40.**Figure 4.** Corpus type 3 in specimen No. 1. Outer depression (A); hyaline and necrotic zones (B); coiled arterioles (C); cavity (D). H/E × 100.**Figure 3.** Corpus type 2 in specimen No. 1. Radiated arrangement of hyalinized tissue (A). H/E × 10.**Figure 5.** Corpus luteum in the left ovary of specimen No. 2. Luteal cells (A); freezing artifacts (B). H/E × 400.

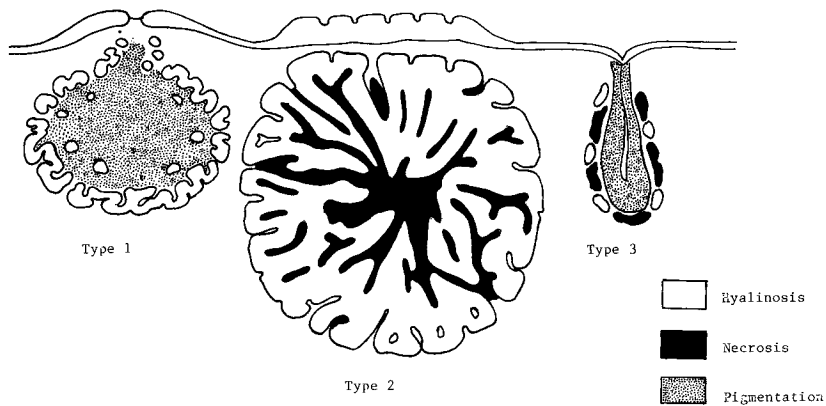


Figure 6. Scars-associated corpora in *Lagenorhynchus australis*.

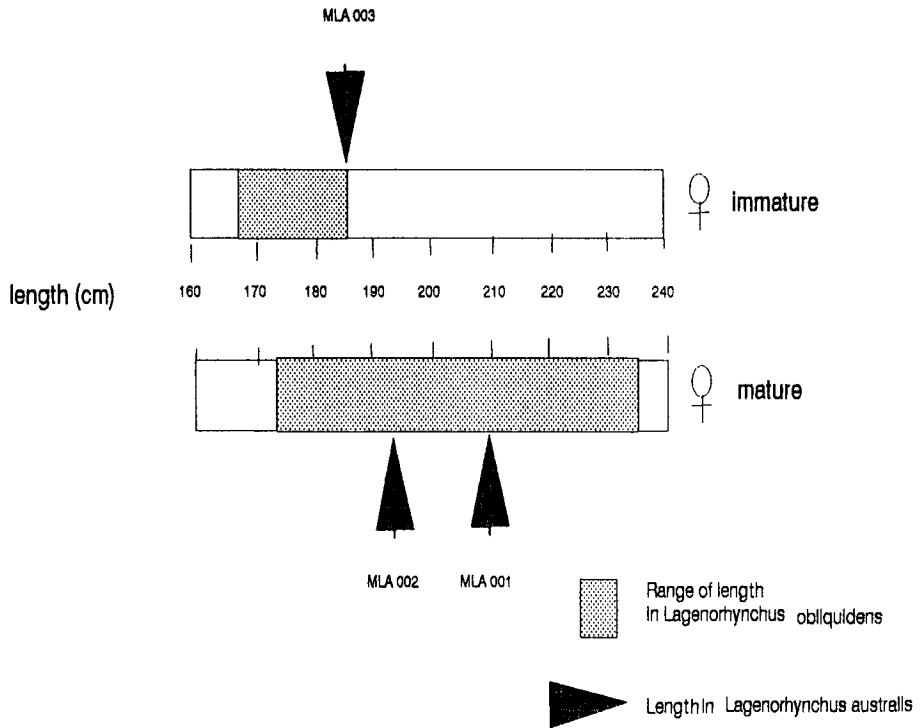


Figure 7. Length and sexual maturity in *Lagenorhynchus australis*. Comparison with data on *Lagenorhynchus obliquidens* (Harrison, J. R., 1969).

by the folding of a much bigger structure. Septa of apparently necrotic tissue separated the hyaline columns from each other (Fig. 3). Hyalinized arterioles were seen in the necrotic core septae. Corpora associated with type 3 scars (7 in total) were elongated masses, approximately 2.5 mm long and

0.8 mm wide, formed principally of pigmented cells similar to those described in association with type 1 scars and surrounded by outer discontinuous zones of hyalinized and necrotic areas (Fig. 4).

Coiled arterioles were often seen in the vicinity of the three types of corpora.

The right ovary of specimen 001 had only two masses, both associated with type 3 scars.

Histological inspection revealed no corpora in the ovaries of specimens 003 and the right ovary from specimen 002. The left ovary of specimen 002 contained a rounded, solid corpus luteum between the cortex and medulla and not associated with a superficial scar. The corpus, 2 mm in diameter, consisted of apparently intact and functional luteal cells (Fig. 5).

Figure 6 illustrates schematically the types of corpora described.

No follicles larger than 2 mm were seen in any of the specimens; most had variable degrees of atresia.

### Discussion

On the available data only tentative deductions are possible on the reproductive parameters of this species.

Because of the lack of ovulatory scars and mature follicles or corpora lutea in the ovaries, specimen 003 (185 cm long) was considered to be immature. This agrees with its comparatively small body size.

Specimen 002 (193 cm long) revealed an active corpus luteum located deep in the left ovary but not associated with a superficial ovulatory scar. It is suggested that this may be an accessory corpus luteum developed by luteinization of a growing non-ovulated follicle (Mossman & Duke, 1973). This remains speculative since we did not find evidence of the ovum or zona pellucida in serial sections. Nevertheless, as it is well established that luteinization is the result of pituitary-gonadotropic action on the follicle and the maturity of the hypothalamo-pituitary-gonadal axis, it is assumed that animal 002 was at the onset of puberty. Only histological examination revealed this; without it the animal would be considered immature on the basis of the lack of any superficial scars on the ovary.

Specimen 001 (210 cm long) was obviously mature because of the presence of many superficial ovulatory scars on the ovaries. Asymmetrical ovarian function is a common feature of many species of odontocetes (Ohsumi, 1946) and was reported in *L. obliquidens* by Harrison, Boice & Brownell (1969).

Histological examination of the corpora made it possible to identify those resulting from pregnancy. Corpora of types 1 and 3 were considered to be atretic cycle corpora on the basis of their small size and the presence of nests of luteal cells. Those classified as type 2 were assumed to be corpora albicantia on the basis of their greater size and the absence of luteal cells.

These histological findings closely resemble those observed in *L. obliquidens* (Harrison, Boice & Brownell, 1969) and *Inis geoffrensis* and *Sotalia fluviatilis* (Harrison & Brownell, 1971) although in our specimens the corpora were not so projecting or pedunculate.

Our observations suggest that female 001 may have had at least 8 pregnancies and another 9 ovulations not followed by pregnancy.

Size at sexual maturity in *L. australis*, when compared with the ranges reported by Harrison, Boice & Brownell (1969) in *L. obliquidens*, seems to be roughly similar (Fig. 7). Nevertheless, we believe that females of *L. australis* may attain sexual maturity at a larger size than *L. obliquidens*, since our only immature animal, at 185 cm long represents the upper end of the length range reported for immature *L. obliquidens*, and our female 002 (193 cm long), which was considered to be at the onset of puberty, is larger than one female *L. obliquidens* (184 cm long) which was reported to have had 8 pregnancies.

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