

CONFIDENTIAL AND PRIVILEGED INFORMATION

UNIVERSITY OF ADELAIDE PATHOLOGY NUMBER: 22-00508

STRANDING DATE: Unknown, first seen 16/03/22

Animal seen alive? Yes **Last seen alive:** 11/03/22 at Outer Harbour breakwater

RECOVERY DATE: 16/03/22 by NPWS rangers

STRANDING REPORTED BY: Community member on 16/03/22

EXAMINATION PERFORMED BY:

DATE OF EXAMINATION: 18/03/2022

LOCATION OF STRANDING: Inner Port, Port Adelaide River, near Birkenhead Bridge.

Latitude: S 34 50 61

Longitude: E 138 29 96

WEATHER CONDITIONS AROUND TIME OF STRANDING: Pending confirmation

NUMBER OF ANIMALS STRANDED: 1 in this event (10 standings state wide in preceding month)

STORAGE PRIOR TO NECROPSY: Refrigerated

DEGREE OF AUTOLYSIS: Moderate autolysis, skin sloughing

SIGNALMENT (species/ age/ sex): *Tursiops aduncus* male adult

WEIGHT (kg): 82.5kg

LENGTH (cm): 195cm

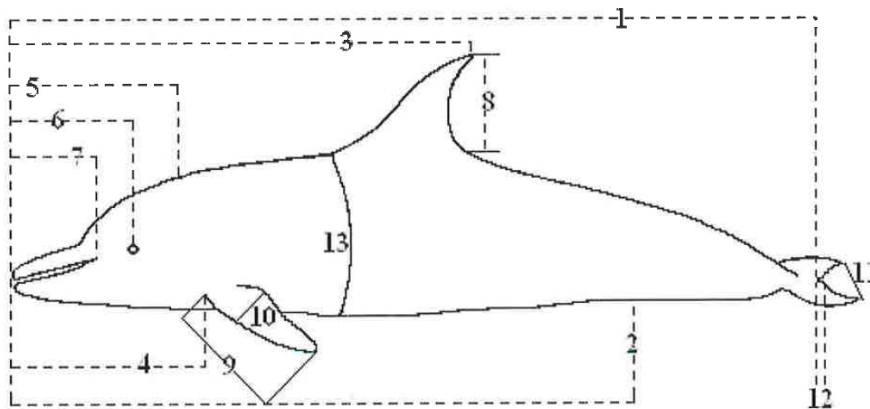
HISTORY: A male adult bottlenose dolphin (*Tursiops aduncus*) named Namor was a transient resident of the Adelaide Dolphin Sanctuary (ADS). Mike Bossley reported that Namor was born in February, 2009 so was 13 years old at the time of his death. In May 2020 he was observed to have a lump on his left flank just caudal to the dorsal fin which resolved without treatment or intervention. He has been sighted infrequently within the ADS in the past year. He was last seen alive on March 11th 2022 and did not show any signs of illness. He was found deceased on 16/03/22 with moderate to marked post mortem decomposition.

SUMMARY (DDx from gross exam):

Contusion and oedema on the ventral aspect of the mandible could indicate trauma; however, definitive diagnosis is pending histological examination and infectious disease screening test results. Due to the recent increased frequency of dolphin mortalities within South Australia, an outbreak of cetacean morbillivirus cannot be ruled out. The presence of a lung abscess in the left craniodorsal lung lobe also requires further investigation to rule out a mycobacterial infection.

Morphometric Measurements

1. Total length (tip of upper jaw to deepest part of fluke notch): 195 cm	9. Length of flipper (anterior to tip): 36 cm
2. Tip of upper jaw to centre of anus: 138.6 cm	10. Width of flipper (maximum): 12.7 cm
3. Tip of upper jaw to tip of dorsal fin: 115 cm	11. Width of tail flukes: 50 cm
4. Tip of upper jaw to anterior insertion of flipper: 47.9 cm	12. Depth of notch between flukes: 4 cm
5. Tip of upper jaw to blowhole: 28.1 cm	13: Maximum girth (+ distance from upper jaw): 116 cm (88 cm)
6. Tip of upper jaw to centre of eye: 31.1 cm	14. Girth at naval: not measured
7. Length of gape: 25.7 cm	15. Girth at anus: 65 cm
8. Height of dorsal fin (tip to base): 21 cm	16. Girth at eye: 77.5 cm



Condition of Animal and Skin

Body Condition: Robust

Skin Condition:

Moderate autolysis with skin sloughing, discolouration, and peeling most notable around the head, dorsal body surface and pectoral fins. External dark-red purple discolouration, interpreted as subcutaneous haemorrhage (bruising, contusion) was noted on the left lateral and ventral aspect of the mandible. On both the caudal right and left side of the animal there was multifocal 5-10mm circular skin lesions that had a dark border and pale centre, interpreted as parasitic lesions. On the right side of the animal just cranial to the tail there was a 100mm long area of raised, pink tinged skin that contained rake marks over the area.

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14.

Subcutaneous Condition:

The subcutaneous soft tissues on the left ventral side of the head extending to the rostral end of the mandible were extensively expanded by dark red gelatinous fluid (interpreted as bruising and oedema). On the left lateral side of the animal just caudal to the dorsal fin there was a dark red-black firm linear mass within the superficial musculature which, when dissected, revealed a 3cm long distal end of a stingray spine.

- 15.
- 16.
- 17.
- 18.

Blowhole

NAD. Swabs collected

Mouth (tongue, teeth condition, lesions, mucous membranes)

NAD.

Left Upper: 18 (1) 4 = 22	Right Upper: 21 (1) 1 = 22
Left Lower: 24	Right Lower: 23

Eyes

Marked decomposition. Conjunctival swabs collected

Ears

NAD.

Genital Slit/ Anus

NAD.

Umbilicus: Healed

19.

Body Cavities

20.

Gastrointestinal Tract

The oesophagus contained a small amount of material which was pale yellow and soft/tacky in consistency. The stomach and gastric contents were not examined as the stomach was collected as a whole for analysis by Sue Gibbs, SAM. The small intestine contained a small amount of yellow to brown coloured liquid digesta throughout and extended into the large intestine. Small amounts of formed faeces were present in the distal colon.

The liver was diffusely dark red and weighed 2.12 kg.

The pancreas was mottled red to purple in colour and was formed and intact when sectioned.

Moderately enlarged mesenteric lymph node which was firm on sectioning.

21.

22.

23.

Respiratory System

The trachea and bronchi contained pink tinged froth. The lungs were incompletely collapsed and were diffusely dark red in colour, with mild rib impressions observed over the dorsal and caudal lung lobes. On the craniodorsal left lung lobe pleural surface there was a 30mm diameter abscess containing purulent material that was adhered the thoracic wall (submitted for culture).

24.

25.

26.

Circulatory System

The heart was mottled red to dark red in colour and weighed 490g. The left ventricular wall measured 14mm in thickness and the right ventricular wall measured 7mm in thickness.

27.

28.

Lymphatic System

The spleen was dark red to purple in colour and weighed 38g.

29.

Musculoskeletal System

Blubber:

Blubber thickness	Mid-dorsal (between head and dorsal fin)	15 mm
	Mid-ventral (just in front of umbilicus)	9 mm

(cm)	Lateral (right) – cranial to dorsal fin	Not recorded
	Lateral (left)	11 mm

Urinary System

NAD. Moderate autolytic change.

Right	Left
Weight: 280g	Weight: 270g

30.

Reproductive System

Testes

NAD. Moderate autolytic change.

Right	Left
Weight: 210 g Length: 195 mm Width: 60 mm Height: 32 mm	Weight: 190 g Length: 180 mm Width: 55 mm Height: 40mm

31.

Endocrine Glands

Thyroid/ Parathyroid:

The left and right thyroid gland was transected as a whole and weighed 10.5 g.

32.

Adrenal:

Right	Left
Weight: 4.3 g	Weight: 4.5 g

33.

Brain, Spinal Cord, Vertebral Column

Marked autolytic change. Spinal cord was liquefied. Cranial vault was not opened and brain was not examined due to marked autolytic change.

MICROBIOLOGY

Culture from the lung abscess revealed moderate pure growth of E.coli

Gross Morphological Diagnosis:

1. Subcutaneous tissue and muscle:
 - a. Ventral and left lateral mandible: locally extensive subcutaneous contusion and oedema.
 - b. Left lateral body wall, caudal to dorsal fin: fibrous encapsulated Stingray barb.

2. Lungs, craniodorsal left lung lobe: focal 30mm diameter abscess with thoracic wall adhesion.

Comments:

Definitive diagnosis is pending histological examination and infectious disease screening test results; however, due to the recent increased frequency of dolphin mortalities within South Australia, an outbreak of cetacean morbillivirus cannot be ruled out. It is also important to rule out a mycobacterial infection due to the presence of a lung abscess. Microbiological culture of the lung abscess revealed a moderate pure growth of E.coli.

Bruising and oedema at the ventral and left mandible suggest blunt force injury to the region, the cause of which is not evidence from this examination. Marked autolytic change precluded examination of the brain. A range of tissues have been collected and preserved for toxicological analysis, including toxins associated with harmful algal blooms.

HISTOPATHOLOGY

22-00508_1, Lung and lung abscess:

Focally within the parenchyma, large abscess with central core of necrotic non degenerate and degenerate neutrophil, pyknotic debris, and variable fibrin and macrophages surrounded by a capsule composed on immature and mature fibrocartilaginous connective tissue. The pleura overlying the abscess is moderately to markedly expanded by immature fibrocartilaginous connective tissues which is expanded by degenerate and non-degenerate neutrophils and fibrin. Frequent pleural vessels in this region contain intravascular fibrin thrombi. In other areas of the lung there is diffuse congestion and frequent rafts of coccobacilli as well as individual large bacterial rods interpreted as post-mortem invaders. Gram stain shows myriad Gram negative coccobacilli within the abscess, as well as rafts of coccobacilli within airways distant from the abscess. ZN stain does not reveal Mycobacteria within the lung abscess.

22-00508_2, Spleen:

NAD. Moderate to marked autolysis may inhibit detection of subtle findings.

22-00508_2, Kidney:

NAD. Moderate to marked autolysis may inhibit detection of subtle findings.

22-00508_3, Heart:

NAD. Moderate to marked autolysis may inhibit detection of subtle findings.

22-00508_3, Liver :

NAD. Moderate to marked autolysis may preclude detection of subtle findings.

22-00508_4, Pancreas:

NAD. Marked autolysis may preclude detection of subtle findings.

22-00508_4, Mesenteric lymph node:

NAD, moderate to marked autolysis may preclude detection of subtle findings.

22-00508_5, Adrenal:

Cortex: medulla ration = 1:1-1.4

NAD, moderate to marked autolysis may preclude detection of subtle findings.

22-00508_5, Thyroid:

NAD. Marked autolysis may preclude detection of subtle findings.

22-00508_6, Proximal, middle and distal intestine:

NAD. Marked autolysis may preclude detection of subtle findings.

22-00508_7, skin lesions:

Skin lesion 1 - lesion RHS distal peduncle: locally extensive superficial to mid scalloped irregular loss of the epidermis - stratum externum, stratum spinosum (interpreted as post mortem predation).

Skin lesion 2: 10mm circular lesion on caudal right side of the animal that has a dark border and pale centre: locally extensive superficial to mid scalloped irregular loss of the epidermis - stratum externum, stratum spinosum (interpreted as post mortem predation).

Skin lesion 3 – 10mm circular lesion on caudal right side of the animal that has a dark border and pale centre: locally extensive superficial to mid scalloped irregular loss of the epidermis - stratum externum, stratum spinosum (interpreted as post mortem predation).

Skin lesion 4, RHS mid peduncle (100mm in length area of raised, pink-tinged skin). There is mild to moderate locally extensive irregular epidermal hyperplasia with blunting, fusion and anastomosis of rete pegs. In the superficial dermis there are increased mononuclear inflammatory cells within the perivascular interstitium of the superficial epidermis. Query increased pigmentation thought stratum basale.

MORPHOLOGICAL DIAGNOSIS

1. Lung abscess and lung: focal lung abscess within parenchyma characterised by inflammatory cells, pyknotic debris and fibrin, encapsulated by a moderate neutrophilic pleuritis with vascular thrombi. Diffuse congestion within surrounding lung parenchyma with bacterial invaders.
2. Skin lesion 4, RHS mid-peduncle: mild to moderate hyperplastic and mixed perivascular dermatitis

COMMENT

The abscess in the lung was bacterial (*E. coli* cultured in heavy growth), and there was suggestion of bacterial pneumonia in other sections of lung - however the degree of autolysis in the lung precludes us from saying definitively how severe and extensive the pneumonia was, and whether this contributed to death or was an incidental finding. The skin lesion from the RHS mid peduncle is considered an incidental finding unrelated to the cause of death.

The cause of the bruising and oedema of the ventral mandible/ jaw was not determined. Traumatic injury is suspected as the cause of this contusion; no significant haemorrhages were identified elsewhere in the body that would otherwise suggest a systemic or non-traumatic cause of haemorrhage (e.g. defects in primary or secondary haemostasis, systemic inflammation and DIC). Regardless of the cause, the injury is not considered significant enough to have caused death.

Toxicity due to a harmful algal bloom has not yet been excluded. Liver from this animal and 22-00440 (Port Julia Dolphin) has been submitted to Analytical Services Tasmania for testing for toxins associated with harmful algal blooms. Results will be issued as available.

CeMV testing was not conducted in this animal, however CeMV testing of animals stranded around the same time (22-00407 – Petrel Cove, 22-00440 – Port Julia, and 22-00406 – Seaford) was negative. Email communication with Dr Tristan Rudd of ACDP provided further information on the PCR test specificity: “The SA 2013 strain assay is developed based on South Australian cetacean morbillivirus from a 2013 outbreak (Kemper et al., 2016). The assay also detects 2009 cetacean morbillivirus of Swan River, Western Australia (Stephens et al., 2009), as well as the more recently circulating strains in WA.” Brucella and Toxoplasma serology is pending.

In summary, the cause of death is yet to be determined. Investigation has been hindered by the degree of post mortem decomposition (brain not examined). Bacterial pneumonia may have contributed to morbidity and/ or mortality. No internal traumatic injuries were found.

Liver from Namor and another dolphin (22-00440 – Port Julia Dolphin) that stranded around the same time were submitted to Analytical Services Tasmania for testing for toxins associated with harmful algal blooms. No toxins were found in these animals by tests for Lipophilic Toxins in Biota by LC-MS/MS and PST in Biota by LC-MS/MS (Boundy Method). Therefore, harmful algal bloom is unlikely to have contributed to death in this case.