

# POST MORTEM FINDINGS IN A STRANDED BRYDE'S WHALE ON THE EAST COAST OF PENINSULAR MALAYSIA

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**ABSTRACT.** A detailed post mortem was carried out on a male Bryde's whale *Balaenoptera brydei*, a cetacean of suborder Mysticetes, with a wide geographical distribution. The stranded whale, weighing approximately 3.5 metric tons was found beached along the Pekan Nenas River, Pahang in East Coast of Malaysia facing South China Sea. Gross pathology showed severe hemorrhagic gastritis, probably due to foreign material found compacted in the multichamber stomach, severe congestion in the various vital organs due to toxemia, and severe endoparasite burden in the intestine. Thousands of Digeneans were found in both the caecum and colon. Morphological identification was carried out on these parasites which were identified as *Ogmogaster species*. As co parasites, the acathocephalan worms *Falsificollis species* was also detected in the large intestine. Histological examination indicated severe bronchointerstitial embolic pneumonia, chronic interstitial hemorrhages, intra alveolar septa

thickening in lung tissue; chronic hepatic interstitial hemorrhage, hepatocellular and centrilobular degeneration on the liver tissue; renal tubular and glomerular necrosis in kidney tissue; splenic necrosis and hemorrhages; intestinal mucosal layer necrosis and severe intestinal villi necrosis. The continuing survival of Bryde's species whale is precarious, because of disregard for appropriate measures for their conservation and to conduct appropriate study for the cause of death

**Keywords:** Bryde's whale, *Ogmogaster species*, *Falsificollis species*, lesion, histopathology

## INTRODUCTION

Bryde's whales, from family *Balaenoptiidae* and genus *Balaenoptera*, prefer tropical and temperate waters over the polar seas. They largely prefer the coastal areas rather than pelagic (deep offshore waters). Bryde's whales are considered medium-sized for balaenopterids, dark gray in color with a

white underbelly. The Bryde's whale is a baleen whale, more specifically a rorqual belonging to the same group as blue whales and humpback whales. It has twin blowholes with a low splashguard to the front. Like other rorquals, it has no teeth, but has two rows of baleen plates. The head of Bryde's whales makes up about 25% of the body, with relatively large eyes. These whales have an erect, curved, pointed, "falcate" dorsal fin located far down its back. The dorsal fin is visible at the surface and flippers are small and slender (Reilly *et al.* 2009 and Olsen, 1913). In Asia, the Bryde's whale has been reported stranded in few nations such as upper Gulf of Thailand off the province of Phetchaburi in 2010 (Bangkok Post, 2010) and coastal waters of the central Philippines in 2007, including another Bryde's whale stranded in eastern Sabah in Malaysia in 2006 (Associated Press Yahoo News).

These whales opportunistically feed on plankton (e.g., krill and copepods) and crustaceans (e.g. pelagic red crabs, shrimp), as well as schooling fish (e.g. anchovy, herring, sardine, mackerel, and pilchard). Bryde's whales use several feeding methods, including skimming the surface, lunging, and bubble nets. As such, very prone to parasitic infections such as the notocotyloid trematode of the genus *Ogmogaster Jagerskiold* 1891 recorded from baleen whales as *O. plicatus*, originally described by Creplin (1829). *Falsificollis species* is another genus of acanthocephalan parasites (Filicollidae) of crustaceans. Infection by acanthocephalans

can result in various alterations of the host phenotype (Bakker *et al.*, 1997 and Baldauf *et al.*, 2007). Amongst parasites altering host behavior, the Acanthocephalan is considered one of the most relevant biological models. Parasitic infections can reduce host immunity leading to more severe secondary infections, which may cause stranding or beaching of whales.

This report is the first reference to the presence of *Ogmogaster sp.* and *Falsificollis sp.* in the Bryde's whale (*Balaenoptera brydei*) in the South China Sea, a finding which helps confirm the world-wide distribution of these parasites. Acanthocephalans have hook-covered proboscis that actually anchor the worm permanently to the host tissue. In *Falsificollis species*, neck inflation bears the proboscis hooks at its distal pole so that the proboscis is not set off from the neck bulb (Harley *et al.*, 2004)

Consequently, relevant pathological and histopathological lesions are described in this beached Bryde's whale found stranded in east coast of Peninsular Malaysia.

## MATERIALS AND METHODS

A young live, male Bryde's whale weighing approximately 3.5 metric tons and 10 metres in length was found stranded at a local fishing village beach in Pekan, Pahang, on the east coast of Peninsular Malaysia. The sick Bryde's whale may have ended up at the beach after getting separated from its pod and losing direction during

low tide. Vigorous attempts were made by the villagers and the local Fisheries Department to save and free it to the sea whereby Marine boats pulled the whale back into the sea during high tide, but the mammal ended up at the beach again the next morning. Villagers sprinkled the sick whale with sea water and covered it with wet blankets and a mattress to cool its skin which was drying out under the sun. Despite various efforts, the whale died 6 hours later in the afternoon. The incident was reported to the Malaysian Fisheries Development Board and Fire and Rescue Department. The postmortem was conducted in situ by a pathology team from the Department of Veterinary Services to determine the cause of death. The required specimens were collected and further analysed at the histopathology, bacteriology and parasitology laboratory. Specimens of blubber, testis, and skin were taken for toxicology analysis. The parasite specimens such as trematodes and acanthocephalans were collected in 70% alcohol-formalin solution for identification.

## RESULTS

The whale carcass was partly autolysed and showed poor body condition. All organs were inspected for abnormalities. The whale was determined as an immature male due to evidence of a testis like structure in the abdomen. There was severe skeletal muscle and blubber trauma due to iatrogenic causes.

The skin was ulcerated and the muscle layers were hemorrhagic. The lungs were congested with frothy exudates in trachea and bronchioles, the liver was swollen due to blood pooling and hemorrhages with some part having yellowish bile stained; the multi-lobulated kidney (50-85%) showed congestion, presence of yellowish mucoid from within the lobules and outer capsule. The heart showed signs of agony with blood vessels engorged, enlarged and hemorrhagic. The esophagus showed congestion and necrosis. There was severe hemorrhagic gastritis with indigestible foreign materials found compacted in the multichamber stomach. The entire mucosal layers of the affected chambers were severely hyperemic compared to the unaffected portion. A hard plastic bottle cap, plastic garbage bag, thick translucent plastic sheet, green nylon rope and a load of fishing nets were clumped and occupied the stomach chambers.

The small intestine showed signs of emphysematous enteritis. There was also multifocal transmural abscesses inconsistently along the tract. Within each abscess was an encapsulated proboscis of the acanthocephalan. The contents of the small intestine was creamy throughout the entire length of the small intestine. The large intestine showed presence of petechial hemorrhages on the serosal surface. The mucosal surface had worms (0.8 mm in length) with huge numbers embedded or sticking to the mucosa layer). The ingesta in some parts of the large intestines was foul smelling and greenish in color with

worms embedded deep in the mucosal layer. The internal layer of the mucosa showed evidence of necrosis throughout the tract. Large numbers of digenean trematodes were seen in the caecum and the colon. The cardiac and peritoneum showed some inflammation and necrosis.

Bacteriology examination, showed the presence of normal flora such as, *Staphylococcus epidermidis*, *Staphylococcus aureus* (2+), *Flexibacter columnaris* (4+), *Aeromonas hydrophila* and *Bacillus species* (2+) from lung, spleen, kidney and liver tissues. The *Bacillus species* (2+) was isolated from lymph node and bile.

Parasitological examination on the intestinal contents, showed no parasite eggs and the organs examined for blood protozoa by impression smear were also negative. The worms collected were identified as the trematode, *Ogmogaster sp.* and acanthocephalan identified as *Falsifilicollis sp.* The acanthocephalan worms, *Falsifilicollis species* has been detected in the intestine in an overwhelming state. Histological examination indicated severe bronchointerstitial embolic pneumonia with sloughing off the epithelium into the lumen and hemorrhage. And, there were also presence of chronic interstitial hemorrhages and intra alveolar septa thickening. In the liver tissue, there were chronic interstitial hemorrhages and presence of hepatocellular and centrilobular degeneration and necrosis. The kidney tissue showed chronic tubular necrosis, severe interstitial hemorrhages

and glomerular degeneration and necrosis. There was splenic necrosis and hemorrhages in the spleen tissue. The heart cardiac tissue showed fragmentation and congestion. There was renal tubular and glomerular necrosis in kidney tissue. In the kidney tissue, there was accumulation of mesangial tissue intra tubular space and nephritis sign. The spleen tissue showed splenic necrosis, active germinal site and hemorrhages. Due to parasitism, the intestine tissues showed mild intestinal mucosal layer necrosis and severe intestinal villi necrosis. Other than that, the skin showed mild epithelial layer necrosis. The cells had foamy cytoplasm (poorly defined), small vacuoles, and increase in reticuloendothelial type cells. The intestinal mucosal layer was necrosis and having severe intestinal villi necrosis.

Toxicological examination indicated that there was no significant findings on the presence of toxin and no evidence of environment pollutant contamination that may lead to the cause of whale death as toxicology tests showed negative results.

Thus, pathology findings were conclusive with severe necrotic enteritis signs due to parasitism and severe hemorrhagic gastritis due to irritation of indigestible materials found. Hemorrhages of multiple vital organs is suggestive of possible infection and toxin exposure. The whale had been showing congestion and hemorrhages which indicates acute signs that may occur within 24 hours. Multiple organ failure leading to weakness may be

the reason for the young Bryde's whale to swim near the shoreline.

## DISCUSSION

Assuming the gastric lesions and the findings of foreign indigestible materials, the whale may have died of severe gastric hemorrhages. The pain probably results in disoriented navigation skills leading to stranding (Rohaya *et al.*, 2009). Contributing causes may be suffocation as there was severe hemorrhage in the pulmonary system, malnutrition and low immunity as there were pathological lesions in all major organs.

In this case, the toxicology reports do not give significant findings as expected. The whale samples tested negative for presence of toxin and pollutant materials. The bacteriology results revealed nonpathogenic organism commonly found in the environment and water source. But the possibility that the whale has been stressed out during malnutrition and stranding period, may have caused infection leading to *Flexibacter columnaris* and *Staphylococcus aureus* infection. The bacterial infection may be spread through contaminated nets and containers (found in the stomach) and contaminated food ingested when the whale was scavenging.

Whale stranding is considered a common phenomenon occurring worldwide due to natural causes, environment effects, diseases that are still largely unknown and also the sickness due to 'ocean-borne' non-biodegradable floating materials.

The role of parasitic disease as a factor in cetaceans stranding is speculative (Geraci, 1978). Trematodes of genus *Ogmogaster* are only known from baleen whales as in this case. *Ogmogaster plicatus* and/or *Ogmogaster antarcticus* appear to be rather common parasites of whales of the genus *Balaenoptera*, as indicated by the findings of Jagerskiold (1891) and Matthews (1983), and Margolis *et al.*, 1955. Thus, most probably the species of the *Ogmogaster* could be either *plicatus* or *antarcticus* although identification to species level not done. Trematodes were small enough in the intestine of this whale and the rate of infection was higher as remarked by Jagerskiold (1891).

The whales of the genus *Balaenoptera* feed mainly in deep water on planktonic crustaceans and small fishes. The possibility that *O. plicatus* and *O. antarcticus* localize in different parts of the intestine of their hosts has been suggested by Dr. Margolis (pers com). The trematodes found in this case were taken from large intestine only compare reported by Jagerskiold's (1891) specimens found primarily in the caecum and small intestine. The trematodes found in this Bryde's whale are not relaxed and free in the intestinal content, but sealed and firmly attached to intestinal mucosa causing multiple nodules and abscessation.

Gastrointestinal helminths parasites in this whale with findings of acanthocephalan in the small intestine revealed heavy parasites burden. These helminths reach the gut of this whale as definitive host as juveniles from ingested

intermediate host through feeding habit. In this case, the acanthocephalan *Falsificollis species* have been immature stage as the temperature of the endothermic whale may have modified the growth rates and maximum body size at any given developmental stage due to space constraint and nutrients (Robert *et al.*, 2003). The size and shape of the *Falsificollis species* referred to Sergio, 1989. The attachment for *Falsificollis species* acanthocephalan has been the hook covered proboscis that may diverse in shape, size and armature. There was inflation of the buried proboscis anchored the worm permanently to the host tissue on the mucosal layer and cause necrosis. The neck inflation bears the proboscis hooks at its distal pole. And, the cuticular spines of variable size, appearances, distribution and extent occur on the trunk as secondary organ for attachment. Thus, in this case the findings of *Falsificollis species* were significant with the pathological lesion present in the small intestine. Overall, the whale was found to be in poor body condition with signs of malnutrition as well as severe infection in the gastrointestinal tract and other organs which may be due to several factors such as parasitism and bacterial infection. The opportunity to study the stranded Bryde's whale gave an insight as to the possible causes of death.

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