

Post-mortem examination on a young fin whale (*Balaenoptera physalus*)

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Abstract

On 2006, the Italian Large Cetacean Necropsy Team, funded from the Italian Ministry of the Environment within the ACCOBAMS agreement, performed the post-mortem examination of two animals stranded along Italian coastlines. The first intervention was an unidentified, badly preserved beaked whale carcass. On the second animal, a young male fin whale, 5.40 mt long in length, a complete necropsy was carried out one day after stranding. Main gross findings were granulomatous parasitic myocarditis, parasite cysts in urinary bladder ligaments and a large haemorrhagic area on the soft tissue of the dorsal neck region. Cardiac failure due to parasitic granulomas was the likely cause of death.

Collisions between vessels and cetaceans are recently recognized as a significant conservation threat, in particular in the case of endangered, endemic or geographically-isolated marine mammals populations and they may be happening more frequently than previously suspected. French and Italian strandings records (covering the periods 1972-98, and 1986-97 respectively) cite ship strikes as the known or possible cause of death in up to 22% of fin whale strandings (ACCOBAMS, 2006).

In order to better estimate the number of ship strikes in 2005, an ACCOBAMS workshop recommended to perform more detailed and systematic necropsies on stranded large cetaceans, encouraging the use of other methods, such as histochemical techniques, to establish whether collision injuries occurred pre- or post-mortem. In agreement with this ACCOBAMS statement in 2006, the Italian Ministry of the Environment funded the creation of a well-equipped necropsy team to carry out a complete and detailed postmortem examination on large cetaceans along all the Italian coastline. To this aim, a collaboration was established among National Stranding Network, the Mediterranean Marine Mammals Tissue Bank (MMTB), the Museum of Natural History of Milan (MNHM), the National Coast Guard, several associations and local contacts.

Since April 2006, two cases were submitted to the Italian Large Cetacean Necropsy Team (ILCNT). The first animal was referred as an unidentified whale found stranded on the Tuscany coast (Capalbio, GR). The subject was badly preserved, with most of the bones exposed and the main cavities open. It was possible to recover only the skull and cervical and caudal vertebrae. No fractures were observed. A deeper evaluation of the skull allowed to recognize the animal as an adult, 4.9 m long Cuvier's beaked whale (*Ziphius cavirostris*).

The second animal was a newborn fin whale (*Balaenoptera physalus*) previously seen alive in the waters close to Savona (SV), in the Northern Tyrrhenian Sea, and found dead, stranded on the shores of Finale Ligure (SV), 4 days afterworths. The subject was then moved by truck to Padova, where a complete postmortem examination was carried out. The animal was 5.4 m long and it weighed about 1,200 kg. It was scarcely preserved and in poor body conditions (dorsal blubber thickness was 1.7 cm). A blunt trauma was noticed as an hematoma on the

right dorsal cervical region, but no fat emboli could be microscopically demonstrated using the “en bloc” osmium tetroxide method: the presence of fat material in pulmonary vessels detected using this histochemical forensic technique allows to differentiate ante mortem traumatic lesions from postmortem ones (Abramowsky C.R. *et al.*, 1981; Davison P.R. and Cohle S.D., 1987; Fernandez *et al.*, 2005). Other important findings were 5 cystic, fluid-filled formations in the urinary bladder ligaments that histology defined as possible parasitic cysts for the presence of many ovoid elements (possibly ova), encapsulated by a thick fibro-muscular wall. Several granulomas were found in the myocardium of the left ventricle, mainly in sub-endocardial location. These nodules, 5-12 mm in diameter nodules, contained a yellowish amorphous material and were well delimited by a thin fibrous wall. At microscopic examination, many degenerated, irregular fragments of PAS-positive material (likely parasites), were observed in the above lesions. Rarely, structures resembling ovaries and intestine were seen in these formations, which were embedded in a dense mixed population of degenerated and lytic inflammatory cells. A diffuse population of clostridial elements widely colonized all tissues. Investigations for *Toxoplasma* sp., *Neospora* sp. and *Sarcocysts* sp., made by RT-PCR, were negative and parasitologists were unable to identify any parasite species from both cardiac and peritoneal lesions and tissue samples. *Coccidia* sp. were recognized in intestinal content. The cause of death was related to the cardiac granulomatous myocarditis, which possibly caused a progressive cardiac failure.

In literature, no parasites are described associated with granulomas in the heart of marine mammals. Even if cardiac granulomas due to metazoan parasites are a very rare finding, in particular in a marine environment, hypotheses of migrating larval nematodes (*Crassicauda* sp.) or of accidental and anomalous parasites infection were made. The age and dimensions of the studied whale and the chronicity of lesions observed suggest a trans-placental transmission. The features of the cervical hematoma and the absence of fat emboli in lung vessels, allow us to rule out a collision as a possible cause of death, even if the animal was young, sick and presumably a slow swimmers, all factors predisposing a ship strike.

References

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