A Tale of Two Tails: Examination and Tissue Analyses of a Seal-Eating Walrus

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Stomach Contents

Figure 1a: Harvesting blubber from the seal-eating walrus

Figure 1b: Contents of the stomach of an adult male Pacific walrus. Tails of two ringed seals (Phoca hispida)

Figure 1c: First ringed seal blubber and attached skin

Figure 1d: Second ringed seal pelage with possible chew marks

Figure 1e: ~93 Mya sp. siphons. Not pictured: seal whisker, seal claw, possible liver/spleen and 24 small rocks

Background

Pacific walruses (Odobenus rosmarus divergens) are adapted to forage for benthic invertebrate prey (Fay 1982). However, this species is also known to feed on seals and seabirds, (Lowry and Fay 1984). Previous investigations have been limited to stomach content analysis tending to be biased towards hard-bodied prey (Sheffield and Grebmeier 2009). Here we present the first multipronged scientific analysis of a known “seal-eating” Pacific walrus.

The walrus was subsistence-harvested off the coast of Barrow, Alaska on June 29th, 2011. Gross anatomical examination performed at the North Slope Borough Department of Wildlife Management determined the animal to be a young adult male in excellent body condition. All other analyses (save histological examination performed at the Colorado State University School of Veterinary Medicine) were conducted at the University of Alaska Fairbanks.

Stable Isotope Analysis

Figure 2: δ13C (upper) and δ15N (lower) along the length of a whisker. The blue circle shows the spike in stable nitrogen isotope signature immediately prior to death. This enrichment is consistent with consumption of higher trophic level prey. 15N enrichment at the whisker base is mirrored by a depletion in 13C likely due to the increased consumption of fat/blubber.

Stable carbon (13C/12C) and nitrogen (15N/14N) isotope ratios of whisker subsections, muscle, and liver were analyzed. As a metabolically inert tissue, whisker sections every 1 mm along the length of the hair provide an isotopic record over approximately ~2.5 years (estimated from Hiron et al. 2001) (Figure 2).

- Nitrogen-15 at the base of the whisker (~16.75‰) is consistent with the consumption of seal immediately prior to death
- Fluctuations in δ15N indicate periodic foraging on higher trophic level prey
- Oscillations in δ13C mirror fluctuations in δ15N indicative of consumption of blubber (as lipid has a carbon-13 depleted signature) (DeNiro and Epstein, 1977). Alternately or in addition carbon-13 fluctuations suggest predation on pelagic pinnipeds versus benthic invertebrates (Herreman et al. 2009).
- This indicates that reliance on higher trophic level prey by this walrus was seasonal and/or opportunistic

Histology

Figure 3: Histology of heart (left) and mesenteric lymph node (right)

Heart Myocarditis
Mesenteric Lymph Node Splendore-Hoeppli Phenomenon

- Occasional lymphoplasmacytic infiltrates and mild hepato-cellular necrosis in hepatic parenchyma consistent with parasitic migration or presence of a mild bactereemia
- Pyogranulomatous inflammation in the mesenteric lymph node with Splendore-Hoeppli Bodies Additional staining techniques failed to demonstrate bacterial or fungal microorganisms.
- Overall, this walrus was in excellent health and body condition with no histopathological evidence of immunosuppression or endocrine disruption associated with exposure to contaminants. The described lesions are incidental, resolving lesions, likely of a parasitic or bacterial etiology.

Trichinella Assay

Assessment of Trichinella sp. was performed in duplicate via artificial digestion method after Forbes and Gajadhar (1999). The zoonotic parasite was not detected.

Acknowledgements: The authors thank the Nayakik family for their generosity in sharing this find. We are also indebted to K. Koks for necropsy assistance, and G. Forrest for spent preparing whisker samples for isotope analysis. We also thank T. R. Spraker, DACVP and longtime Colorado State Diagnostic and Marine Mammal Pathologist, for his histopathological expertise and support of this work. Additional thanks to J. Herreman for constructive criticism.