Stomach Content Analysis of *Tursiops truncatus* Stranded in Wilmington, NC

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Background

Tursiops truncatus, otherwise known as the common bottlenose dolphin, is a wide-ranging marine mammal and can be found in most of the world's warm temperate to tropical seas, in coastal areas and offshore. With the exacerbation of anthropogenic debris in marine ecosystems, ingestion of marine debris by cetaceans is taking place. Debris ingestion can cause damage to the digestive tract due to ulcerations, perforations, and obstructions (Di Beneditto & Ramos, 2014). In the common bottlenose dolphin, there are three parts of the stomach. The first chamber or forestomach is the largest of the compartments and can distend and stretch easily. It serves as a receiving chamber for food. The second chamber also called the glandular or main chamber is responsible for secreting the digestive enzymes which break down the food. Lastly, the pyloric compartment functions to regulate passage of digested food into the small intestines. Stomach contents of three bottlenose dolphins were received from the NC State Marine Mammal Stranding Program in collaboration with the University of North Carolina Wilmington where the dolphins had been compromised due to stranding. Through UNCW's Oriole Burevitch lab, the stomach contents of 7 *Tursiops truncatus* were dissected and suspicious particles removed. Only 1 of the 7 dolphins, JMS073, had particles removed and fully analyzed for synthetic debris. Contents within the stomachs that appeared synthetic were separated and sent to the Plastic Ocean Project office for further analysis under Fourier Transform Infrared Spectroscopy (FTIR) and Attenuated Total Reflection (ATR) instruments. FTIR-ATR measures the range of wavelengths within the infrared region that is absorbed by a material, aiding in the identification of materials. FTIR is commonly used to analyze Polyethylene Teraphalate in the marine environment (Ioakeimidis et al., 2016).

Materials and Methods

Materials:

- Dissection Scissors, Trays, Forceps
- ATR/FTIR Spectroscopy Instruments
- Nitrile gloves
- Sieve array (progressively finer meshes)
- Branson Sonicator
- Plastic sample containers and Tupperware weighing containers
- Methanol
- Protective eyewear
- Coveralls

Phase One: Dolphin Dissection

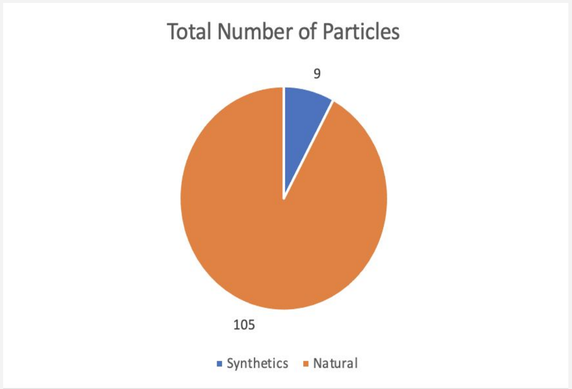
- Assembled dolphin digestive tract on main dissection table
- Tared weighing containers
- Separated each stomach chamber, took pictures of each
- Beginning with the forestomach, weighed each chamber and transferred to sieve apparatus
- Removed any suspicious particles or parasites under running water

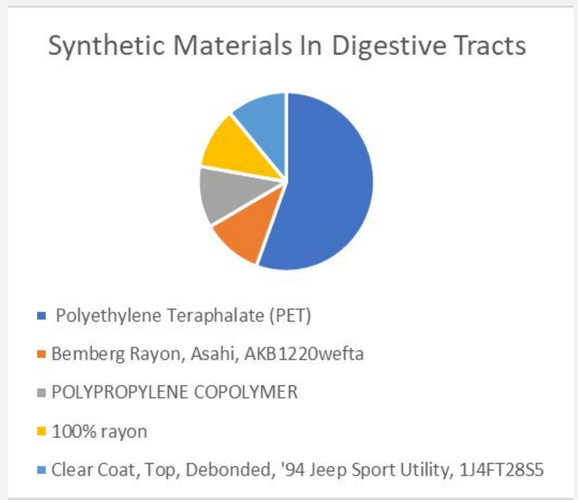
Phase Two: Particle Analysis

- Sonicated suspicious particles
- Placed particles on FTIR or ATR plate dispensing on size
- Used OMNIC software to complete spectral analyses
- Compared particles to closest spectral matches in FTIR/ATR databases
- Discarded natural materials and kept synthetics

Results and Discussion

Overall, most of the suspicious materials found within the digestive tracts of the dolphins were identified as natural materials using FTIR analysis. This does not mean that there were no synthetic materials present, however. Some of the materials found within the digestive tracts were synthetics and were 1mm or smaller, the most prevalent of which was polyethylene terephthalate. Other synthetic materials include rayon, polypropylene, and substances used in paint.





Conclusion

Of the synthetic materials found in the *Tursiops truncatus* stomachs, the highest concentration was Polyethylene Teraphalate (PET). This type of plastic is found in clothing, food and drink packaging, and fibers. The presence of PET along with other synthetic materials (paint material, rayon, and polypropylene) implies that man-made synthetic materials are making their way into the digestive tracts of large marine mammals. This is only the results of 1 of the 7 *Tursiops truncatus* dissected. Continued research is necessary to gain a better understanding of the types and abundance of plastics that can be found in the digestive tracts of dolphin species. This study, in collaboration with numerous other studies on the impacts of synthetic debris in our oceans, could help support a better understanding of impacts of plastic on marine life and support the need for creating safer biodegradable synthetic materials or completely stopping the production of plastics such as PET.

References/Acknowledgments

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