

Systematic review of *Photobacterium damsela* infections in cetaceans

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APPENDICES
AND
BIBLIOGRAPHY

1 INTRODUCTION AND OBJECTIVES

Photobacterium damsela subsp. *damsela* (PDD) is a gram-negative, ubiquitous marine bacterium, known as a pathogen in various marine species and humans. It is frequently detected in stranded cetaceans, but its pathogenic role in these species is unclear. Literature often describes it as an opportunistic pathogen, especially in immunocompromised animals or those with coinfections. However, there are also reports suggesting it could act as a primary pathogenic agent.

Given the limited available information and the ambiguity of its role, this TFG conducted a systematic search of reported PDD cases in cetaceans. The **objective** was to analyze these findings to provide new knowledge and contribute to a better understanding of its role in infectious processes.

2 MATERIALS AND METHODS

The systematic search was performed using Google Scholar, structured using the Boolean technique: (“**photobacterium damsela**” OR “**Vibrio damsela**”) AND (cetacean OR “**marine mammals**” OR dolphin OR whale OR porpoise).

The main inclusion criterion was the **isolation of PDD in stranded cetaceans that had undergone necropsy**.

Identified articles were subjected to a two-phase selection process: a first based on reading abstracts and a second involving in-depth reading. Selected articles were classified, and the relevant data were tabulated and analyzed to summarize the most important information.

3 RESULTS

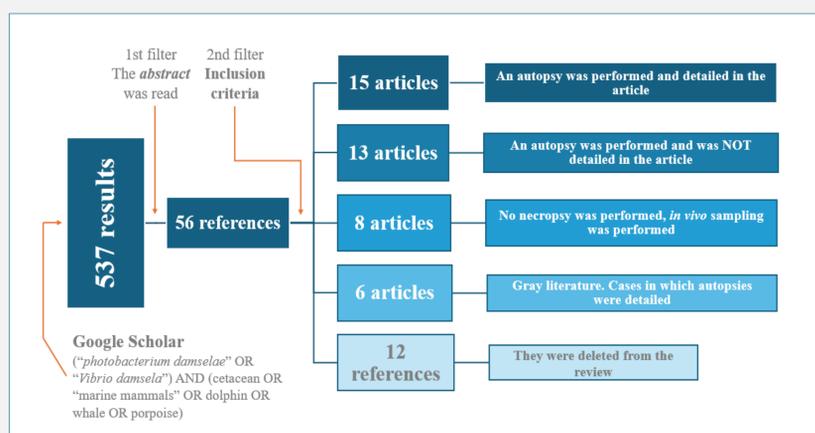


Figure 1. Process and results of the systematic search.

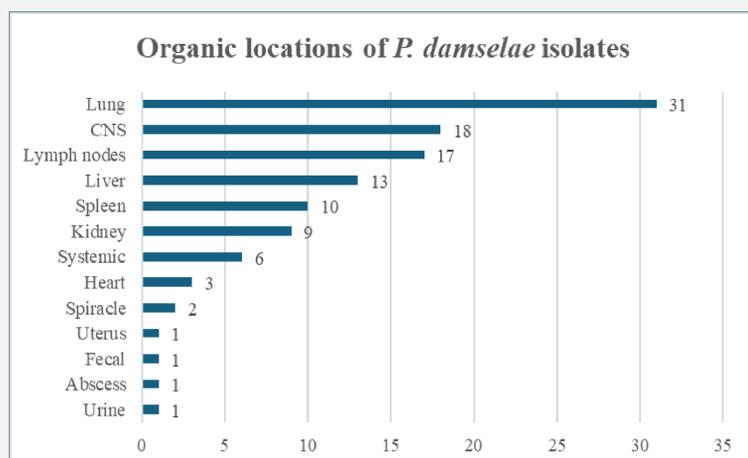


Figure 3. Distribution of PDD isolates by organic locations. The lungs is the most frequently isolated location. Over 55% of cases involved multiple organs.

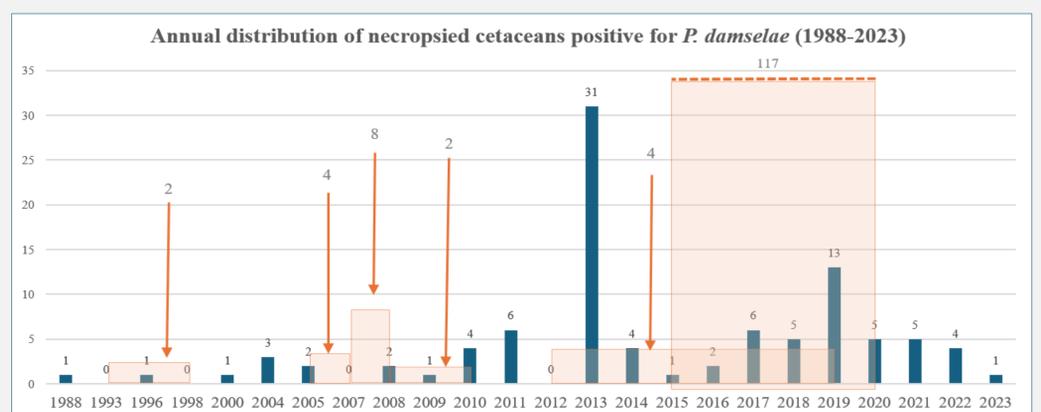


Figure 2. Representation of all necropsied cetacean cases that tested positive for PDD. In blue, the cases with a known stranding date; in orange, the cases grouped by year where the exact date was not reported.

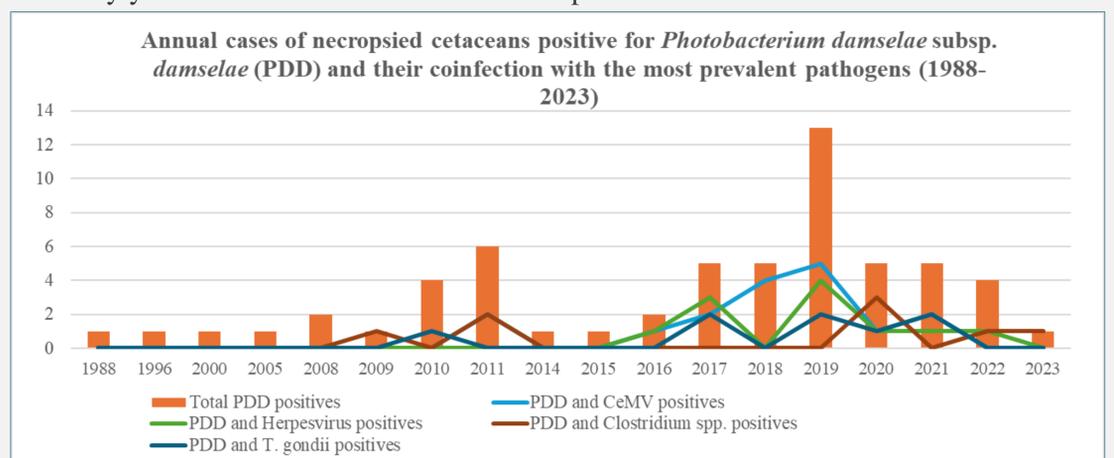


Figure 4. Annual trends of PDD in cetaceans and coinfections with key pathogens. A marked peak in PDD and coinfections occurred in 2019. CeMV and Herpesvirus were the most frequent coinfections in PDD-positive cetaceans.

4 DISCUSSION

- PDD demonstrated a capacity for **systemic dissemination**, as 55.6% of internal isolations involved two or more organs simultaneously. The **lung** was the most frequently isolated organ but also the Central Nervous System and lymphatic organs, suggesting possible **routes of entry** and a **capacity for invasion** and **interaction** with the **immune system**.
- PDD often acted as an **opportunistic pathogen** in immunocompromised animals, particularly those with **CeMV** and **Herpesvirus** coinfections. However, cases of systemic isolation were also reported without other clear pathologies, suggesting its **potential as a primary pathogenic agent**.
- The temporal distribution suggested a possible increase in detection or prevalence, but the **lack of uniformity** in the information **complicated** the **interpretation** of the trends.

5 CONCLUSIONS

The systemic dissemination of PDD, the uncertainty surrounding its pathogenic mechanisms, and its complex role (primary/opportunistic) in cetaceans, position it as an emerging threat that demands **in-depth research** to understand its scope and **active epidemiological surveillance** to protect the health of these vulnerable populations.