

University of Texas of the Permian Basin

**FalconCommons**

---

College of Arts & Sciences

Dissertations & Theses

---

5-2020

## **Hexadecane Petroleum, and Biofuel Utilization in Marine Bacteria Isolated from Ballast Tanks**

Alex Yashchenko

Follow this and additional works at: <https://falconcommons.utpb.edu/utpb-cas>



Part of the [Algae Commons](#), [Bacteria Commons](#), [Biochemistry](#), [Biophysics](#), and [Structural Biology Commons](#), [Biotechnology Commons](#), [Botany Commons](#), [Business Commons](#), [Other Pharmacology](#), [Toxicology and Environmental Health Commons](#), and the [Research Methods in Life Sciences Commons](#)

---

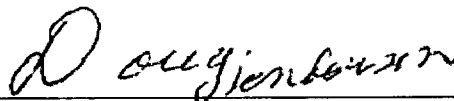
HEXADECANE, PETROLEUM, AND BIOFUEL UTILIZATION IN MARINE  
BACTERIA ISOLATED FROM BALLAST TANKS

APPROVED BY SUPERVISORY COMMITTEE:



Athenia L. Oldham, PhD.

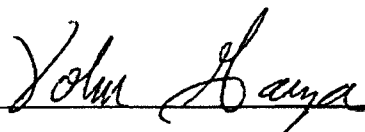
Chair



Douglas P. Henderson, PhD.



Gae. E. Kovalick, PhD.



John Garza, PhD.

Graduate Faculty Representative

HEXADECANE, PETROLEUM, AND BIOFUEL UTILIZATION IN MARINE  
BACTERIA ISOLATED FROM BALLAST TANKS

By

ALEX YASHCHENKO, B.S.

THESIS

Presented to the Graduate Faculty of Biology

The University of Texas of the Permian Basin

In Partial Fulfillment

Of Requirements

For the Degree of

MASTER OF SCIENCE

THE UNIVERSITY OF TEXAS OF THE PERMIAN BASIN

May 2020

## ABSTRACT

This study characterized the growth of bacteria isolated from ballast tank fluids in hexadecane, petroleum, plant, and algae-derived fuels. The study was performed to explore the capacity of ballast tank isolates to survive and grow within fuels that may be stored within ballast tanks. Results of the hexadecane analysis indicated that most isolates had higher viable cell counts in media supplemented with hexadecane. Members of *Alteromonas*, *Pseudoalteromonas*, and a single *Brevundimonas* species had viable cell counts that were one or several orders of magnitude greater than that of controls. Results of fuel analysis indicated higher viable cell counts in pure JP-5 and F-76 petroleum, as well as a modest growth increase in camelina-based JP-5 biofuel for members of *Alteromonas*. *Bacillus aquimaris* TF-12 and the unclassified isolate, SD32, had a pronounced decrease in growth under all the fuel conditions, with the sole exception of elevated growth in hexadecane. *Halomonas axialensis* Althfl demonstrated substantial growth in all the tested conditions, especially in JP-5 camelina and F-76 algal biofuels, while the unclassified isolate, denoted as (-)ve, had significantly decreased bacterial growth in pure JP-5 and F-76 petroleum and elevated growth in both biofuels. Given the diverse growth trends of the tested isolates, future studies will include GC-MS analysis to directly measure hydrocarbon utilization.