Abstract

The taxonomy of bacteria belonging to the Flavobacteriaceae family and pigments of Chryseobacterium species has been widely debated and diversified in the past decades. The presence of Flexirubin, a red-tinted class of pigments, has been observed in an array of bacteria, from polar soil to freshwater environments. The Flavobacteriaceae family has been widely studied, yet their potential to produce enzymatic and structural pigments has been overlooked. The objective of this study was to screen and isolate Chryseobacterium species from underglacial lakes, utilizing a novel purification technique to separate and characterize their enzymatic pigments. The characterization of these pigments was performed using HPLC, to determine their structural variation with the optimized method designed for the project.

Background

Figure 1 illustrates the structural differences between the Flexirubin pigments. Structure A shows the general structure of Flexirubin pigments. Structure B illustrates the structural variation observed in the Flexirubin pigments of Chryseobacterium species. Structure C outlines the structural variation observed in the Flexirubin pigments of Flavobacterium species. Structure D represents the structural variation observed in the Flexirubin pigments of Bacteroidetes species.

Methods

For the isolation of Chryseobacterium species, a variety of extraction methods were utilized. Table 1 summarizes the extraction methods and their respective isolation rates. Table 2 outlines the purification techniques employed to isolate Flexirubin pigments. Table 3 illustrates the structural variations observed in the Flexirubin pigments of Chryseobacterium species.

Conclusion

Successful optimization of Flexirubin purification techniques
- Enough material in C. oranimense to analyze
- Similar Flexirubin profiles observed across species
- Flexirubin variation may clump by genera
- The optimized method to collect Flexirubin profiles will be a useful technique for Flexirubin-producing bacteria

Future Work

- Analyze structures of C. oranimense purified fractions
- Choose other species to purify
- F. granulii, F. stahl, F. tenax
- C. lacus, C. polaris, C. soli, C. aquaequm
- Test Antioxidant Capacity of purified fractions
- Investigate color shift
- Repeat variation experiments
- Publish structures

References

Acknowledgements

The author (KK) wishes to thank the Undergraduate Student Research Program (UGSP) for financial support. The UGSP is supported by a Haberberger Fellowship awarded by Lycoming College. The authors would like to acknowledge funding from NSF award OCE-0739127 to BNN.