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Using Zebrafish to Do Good: Scientific Data Management

Item Type	Poster
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DOI	10.13028/mzyd-j356
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Link to Item	https://hdl.handle.net/20.500.14038/28623



Using Zebrafish to do Good Scientific Data Management



Case Study of Scientific Research Data Management for Promoting E-Science Education

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Introduction

This case study addresses institutional research in a biomedical neuroscience laboratory at a prestigious research university, conducting experiments with live animals during a long term research project, and also the use of paper lab notebooks.

Setting

The Ohio State Beattie Lab focuses on the motoneuron diseases SMA and ALS. The lab uses Zebrafish as a vertebrate model system for studying motor axon guidance and motoneuron diseases.



Healthy animal with normal SMN levels Animals with reduced SMN levels

Example of Data Flow: florescent microscopy images are saved on a computer attached to the microscope which are then printed out and sent to other computers.

Method

An interview instrument was developed using John's Hopkins University DMP template to interview the lab's graduate student. The interview lead to the creation of a data story, a Data Management Plan and a case study. The research narrative was integrated into the Seven Data Management Principles outlined in the curriculum developed by the UMass Lamar Soutter Library and the WPI George C. Gordon Library.

Modules for Managing Research Data

Module 2: Types, Formats & Stages of Data

- The challenges in conducting a multiyear research project with living specimens
- Instrument data that needs to be exported to a common or open format for analysis, storage, etc.
- Data in digital and paper formats
- Paper lab notebook inconsistencies and lack of standardization

Module 3: Contextual Details

- No use of a data dictionary
- No file naming conventions
- Lack of synchronization between data sources
- No standards for data documentation

Module 4: Data Storage, Backup and Security

- Use of personal computers
- No plan for storage of data files
- No security and backup plan for digital and hardcopy data (lab notebooks)

Module 5: Legal and Ethical Issues

- IACUC-related documentation and compliance
- Need to clarify funding purposes (NIH vs. private)

Module 6: Data Sharing and Re-Use

- Research team uses web-based (cloud) applications to share images and data

Module 7: Plan for Archiving and Preservation of Data

- Need for preservation-friendly image and document file formats and media
- Use of model organism repository

Conclusion

E-Science expands the scope of science library practices and promotes, among medical science students, the preservation of scientific data in relevant repositories and archives. Using this case study as an E-Science tool, students will understand data management principles and challenges in the context of familiar research settings, the benefits of preserving scientific data, and how these practices will lead to a more homogeneous research future.

Example of Data Preservation: publications and Zebrafish lines are shared with the science community through journal publication and the use of repositories that house data on genetically modified Zebrafish lines, such as ZFIN, the NIH-funded zebrafish model organism database. However, the lab does not use the university repository for other raw data.

[View the Case Study](#)



Acknowledgements

Elaine Martin, Donna Kafel & Andrew Creamer
Simmons College & LIS 532G Fall 2013
Alessandra Welker & The Beattie Lab Ohio State

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