

Preparing High School Students to be Successful STEM Majors:

The Mobile DNA Laboratory

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University of Findlay

Biology Program

2009-2013

DNA Day

Arcadia

Findlay

Riverdale

Arlington

Liberty-Benton

Vanlue

Cory-Rawson

McComb

Van Buren



All nine schools
are in Hancock
County.



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2009-2013

DNA Day Schedule

9:00 am	Arrival Lecture on RFLP analysis Micropipetting exercise DNA Extraction Digestion Reaction
11:00 am	Lunch Campus Tour
12:30 pm	Electrophoresis/Results
2:00 pm	Departure



2013-2014

Ohio New Learning Standards: Science (2011)

DNA Day program on hiatus

University of Findlay Goal-Getter Awards



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2014-2015

Mobile DNA Laboratory

Applications sent to 53 schools



Continental HS
(Putnam Co.)

Shawnee HS
(Clark Co.)

Upper Scioto Valley HS
(Hardin Co.)

Wynford HS
(Wyandot Co.)



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Day 1

- **Fall 2014**
- **CMW teaches PCR in biology classrooms.**

Day 2

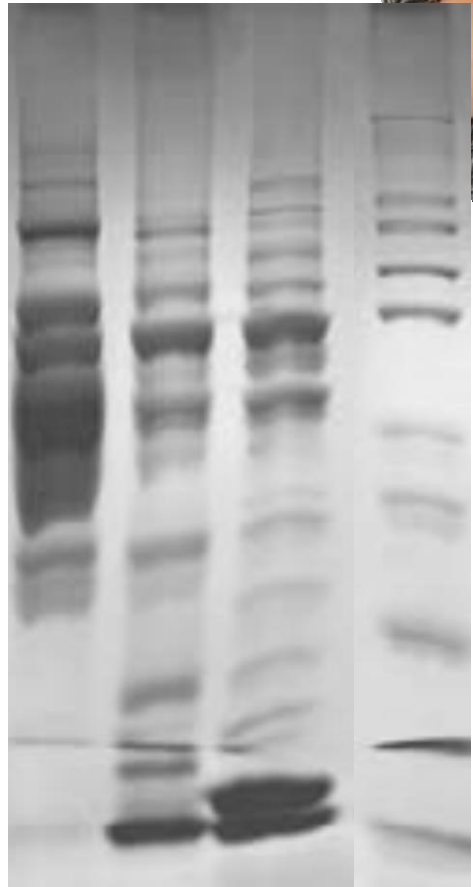
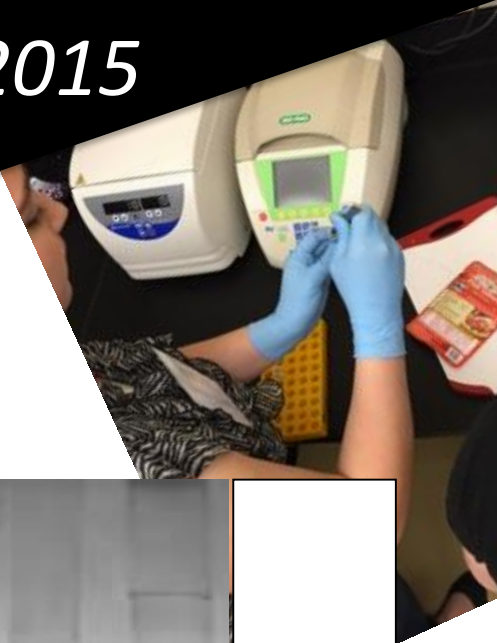
- **Spring 2015**
- **CMW teaches use of micropipettors and DNA extraction in biology classrooms.**

Day 3

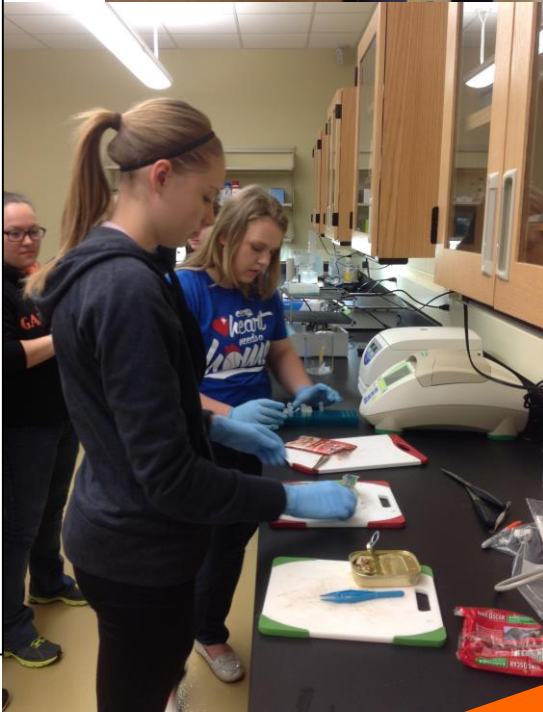
- **April 24, 2015**
- **BDHD leads exploration of NCBI database.**
- **Lunch/campus tour**
- **BDHD leads experiment on fish muscle proteins.**



2014-2015



200
116.3
97.4
66.3
55.4
36.5
31.0
21.5
14.4



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Tuna Sardines Herring Ladder

2015-2016

DNA Day program on hiatus

Martha Holden Jennings Foundation



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2016-2017



Ft. Jennings HS
(Putnam Co.)

Lima Central Catholic HS
(Allen Co.)

Hopewell-Loudon HS
(Seneca Co.)

Mohawk HS
(Wyandot Co.)

Northwood HS
(Wood Co.)



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2016-2017

School #1

Average Pre-test score: 2.03/10

Average Post-test score: 4.62/10

Expanded Paired t-test:

$p < 0.0001$ Significant increase

Average Pre-test score: 1.00/10

Average Post-test score: 2.11/10

Expanded Paired t-test:

$p = 0.0039$ Significant increase

School #3

School #2

Average Pre-test score: 0.51/10

Average Post-test score: 0.89/10

Expanded Paired t-test:

$p = 0.154$ Not a significant increase

Average Pre-test score: 4.63/10

Average Post-test score: 5.73/10

Expanded Paired t-test:

$p = 0.0018$ Significant increase

School #4



2016-2017

School #5

Average Pre-test score: 1.36/10

Average Post-test score: 8.00/10

Expanded Paired t-test:

$p < 0.0001$ Significant increase

Combined Scores

Average Pre-test score: 1.85/10

Average Post-test score: 2.13/10

Expanded Paired t-test:

$p < 0.0001$ Significant increase



2016-2017

School #1

Average Pre-visit Comfort Level: 1.82/10
Average Post-visit Comfort Level: 6.00/10

Expanded Paired t-test:
 $p < 0.0001$ **Significant increase**

School #2

Average Pre-visit Comfort Level: 1.26/10
Average Post-visit Comfort Level: 3.32/10

Expanded Paired t-test:
 $p < 0.0001$ **Significant increase**

Average Pre-visit Comfort Level: 1.18/10
Average Post-visit Comfort Level: 5.74/10

Expanded Paired t-test:
 $p < 0.0001$ **Significant increase**

School #3

Average Pre-visit Comfort Level: 2.41/10
Average Post-visit Comfort Level: 7.66/10

Expanded Paired t-test:
 $p = 0.0018$ **Significant increase**

School #4



2016-2017

School #5

Average Pre-visit Comfort Level: 1.36/10
Average Post-test score: 8.00/10

Expanded Paired t-test:
p<0.0001 Significant increase

Combined Scores

Average Pre-visit Comfort Level: 1.42/10
Average Post-visit Comfort Level: 5.38/10

Expanded Paired t-test:
p<0.0001 Significant increase



Conclusions/Future Plans

- **Students understanding of PCR and DNA technologies increased significantly in all but one school measured.**
- **Students self-reported comfort level with the use of micropipettors increased significantly in each school measured.**
- **Teachers believe this program is an enormous benefit to their students.** (Additional evidence not presented here)
- **Application for an additional year of funding from Martha Holden Jennings Foundation in the works.**
- **Modifications to the program will coincide with advice from teacher evaluations.** (Additional evidence not provided here)



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 - Kristin Meeks (Shawnee HS)
 - Norma Perrone (Upper Scioto Valley HS)
 - Deb Schenk (Lima Central Catholic HS)
 - David Shumaker (Northwood HS)
 - Kelly Wheeler (Wynford HS)
 - Carla Young (Hopewell-Loudon HS)



Questions?



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