

Invited Course Faculty

Alejandro Sanchez Alvarado
Stowers Institute for Medical Research

Beth Duncan
University of Kentucky

James Godwin
The Jackson Laboratory

Vera Gorbunova
University of Rochester

Joel Graber
MDI Biological Laboratory

Itamar Harel
The Hebrew University of Jerusalem

Celina Juliano
UC Davis

Benjamin King
University of Maine

Malcolm Maden
University of Florida

James Monaghan
Northeastern University

Aric Rogers
MDI Biological Laboratory

Ashley Seifert
University of Kentucky

Voot Yin
MDI Biological Laboratory

Course Modules

Nexus between aging and regeneration

Planaria regeneration

Hydra regeneration

Heart regeneration

Histology and pathology

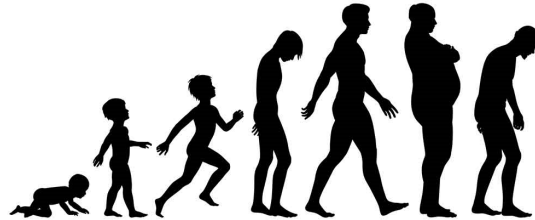
Limb Regeneration

iCARB: Immersion in Comparative Aging and Regeneration Biology

An Applied Laboratory in Aging and Regeneration
Research Models
July 20-August 3, 2019

Director: Voot P. Yin, Ph.D., MDI Biological Laboratory
Co-Director: Aric Rogers, Ph.D. MDI Biological Laboratory

This hands-on research training course brings together leading scientists and students to explore fundamental questions at the intersection of regenerative capacity and aging and its practical application. Held near Acadia National Park in Bar Harbor, ME, the course emphasizes research using diverse experimental approaches and model systems, complemented with seminars and networking opportunities by leaders of the field.



Within this dynamic environment each student will: 1) characterize and compare regenerative potential across a wide array of species; 2) investigate changes in regenerative potential during aging; 3) combine microsurgical methods with state of the art histology and molecular analysis; and 4) join a growing network of colleagues studying the cross-roads between regeneration and aging.

More Information

Details on the use of specific model systems, technology and paradigms addressed in the course, as well as the online application, are available at

<https://mdibl.org/course/aging-regenerative-biology-2019/>

Applications will be reviewed on a rolling basis until the course is full. Students, Postdoctoral Fellows and Junior Faculty are encouraged to apply. **Maximum enrollment is 24, so apply now!**

Inquiries

Education Office
MDI Biological Laboratory
education@mdibl.org



2019 iCARB: immersion in Comparative Aging and Regenerative Biology Short Course Schedule

Note: Breakfast is self serve each day in the Dining Hall

As of 6/7/19, subject to change

July 20, 2019 **Saturday**

5 PM S tudent arrival, check-in at Dining Hall, early arrivals can wait in the lounge with open wifi.
6-7 PM Dinner—Dining Hall
7-9PM **Introduction, Voot Yin and Aric Rogers, MDIBL tour and mixer --- MCBI**

July 21, 2019 **Sunday**

8-10AM Breakfast on your own—Dining hall
10-11AM **Course introduction by Voot and Aric---blending the themes of regeneration and aging--MCBI**
11-noon **Pit Talk, Celina Juliano and hydra regeneration---MCBI**
Noon-1PM Lunch in Dining Hall
1-4PM Lab: Hydra experiments
4-6PM Free time
6-7 PM Dinner

July 22, 2019 **Monday**

9-10 AM **Pit Talk, Ashley Seifert and Spiny mouse regeneration (mammals) and immune system---MCBI**
10-noon Lab: Histology techniques the value to understanding regeneration
12-1PM Lunch in dining hall
2-6PM Lab: Hydra regeneration
Tissue processing and histology
4-5PM **Cserr Lecture: Vera Gorbunova: Comparative Biology of Aging--Maren auditorium**
5-6PM Speaker Reception—Maren Foyer
6-8PM Dinner with Dr. Gorbunova—Dining Hall
Discussion point: comparative aging in mammals and the intersection of regenerative capacity

July 23, 2019 **Tuesday**

9-10AM **Pit Talk, Itamar Harel, African killifish and regenerative capacity decline during aging---MCBI**
10-noon Lab: African killifish regeneration
12-1PM Lunch
1-2-PM **Open discussion with faculty---MCBI**
2-6PM Lab: African killifish regeneration
Continuation of hydra experiments
6-7PM Dinner in dining hall
7-9PM Lab: Imaging with light and confocal microscopy---MCBI

July 24, 2019 **Wednesday**

9-10AM **Pit Talk, Beth Duncan, planaria regeneration and RNAi---MCBI**
10-noon Lab: planaria, RNAi and markers of regeneration
12-1PM Lunch in dining hall
1-4PM Lab: Planaria experiments
Imaging regeneration on the confocal
Continuation of experiments
4-5PM **Kinter Lecture: Alejandro Sanchez Alvarado, “Immortality, Aging and Regeneration: Lessons from the Planaria” ---Maren auditorium**
5-6PM Speaker Reception—Maren Foyer

6-8PM Dinner with Dr. Alvarado—Dining hall
Discussion point: immortality and scientific imagination

July 25, 2019 Thursday

9-10AM **Pit Talk, Alejandro Sanchez Alvarado—History of regeneration---MCBI**
10-noon Lab: Check on experiments
12-1PM Lunch in dining hall
1-6PM Free time. Options: Bar Harbor visits; kayaking in Frenchman's Bay; hiking in Acadia National Park (bag lunches available)
6-7PM Dinner
7-9PM **Discussion Point:** cross species comparison among model systems during spinal cord regeneration. Merging modern techniques with traditional model systems—advances and limitations of each system, CRISPRs, making transgenics---MCBI

July 26, 2019 Friday

9-10 **Pit Talk, Joel Graber, RNA-sequencing and bioinformatic analyses--MCBI**
10-10:30 **Pit Talk, Voot Yin, MSI-1436 and regeneration--dataset set that serves as the background for RNA-seq analysis--MCBI**
10:30-12 Lab module: Bioinformatics and analysis of MSI-1436 dataset
12-1 Lunch
1-4PM Lab: Continue bioinformatics module
Check in on experiments
4-5PM **Pit talk, Dr. Rogers, aging research and the impact of C. elegans-MCBI**
6-7PM Dinner in dining hall
7-9PM **Networking panel discussion with faculty**
Roundtables on ethics, teaching and research around regenerative and developmental biology---MCBI

July 27, 2019 Saturday

9-10AM **Pit talk, James Monahan, axolotl limb regeneration,--MCBI**
10-noon Lab: axolotl limb regeneration
Noon-1 Lunch-dining hall
1-6PM Lab: axolotl limb regeneration
Imaging of regeneration
6-7PM Dinner in dining hall

July 28, 2019 Sunday

4:00AM Sunrise and coffee on Cadillac mountain-**Park Passes Required**
11-noon **Pit Talk, Voot Yin, Zebrafish appendage regeneration and microRNA control---MCBI**
12-1PM Lunch
1-2PM **Pit Talk, Ben King, Noncoding RNAs and regulatory circuits---MCBI**
2-6PM Lab: Decoding the roles of noncoding RNAs-bioinformatics approach; lncRNAs zebrafish appendage regeneration
Axolotl regeneration
Continuation of other experiments
6-7PM Dinner

July 29, 2019 Monday

9-11AM **Status update on regeneration experiments**
Think tank-identifying the important questions---MCBI
11-noon Lab: Check in on experiments as needed
12-1PM Lunch-Dining Hall
1-4PM Lab: axolotl experiments
Zebrafish appendage regeneration
4-5PM **Orkand Lecture: Malcolm Maden: axolotl regeneration-Maren Auditorium**

5-6PM Speaker Reception—Maren Foyer
6-8PM Dinner with Dr. Maden-Dining Hall

July 30, 2019 Tuesday

9-1AM Student presentation (10 minutes each)
11-noon Zebrafish lab: imaging and preparation for cryosections
12-1PM Lunch
1-2PM **Pit Talk, Voot Yin, Zebrafish heart regeneration and the influence of the epicardium-MCBI**
2-5PM Lab: zebrafish heart regeneration
axolotl experiments
Imaging
5-6PM **Pit talk, James Godwin, Axolotl heart regeneration and immune response---MCBI**
6-7PM Dinner-Dining Hall

July 31, 2019 Wednesday

9-noon Lab: Axolotl heart injury
Image zebrafish hearts; section hearts
12-1PM Lunch
1-4PM Lab: Check in on experiments as needed
Histology of tissue sections
Combing web databases for conserved genetic programs; molecular analysis, RNAseq, bioinformatics
Status update on axolotl experiments, planaria RNA
4-5PM Public Lecture: Nadia Rosenthal (tentative)
5-6PM Speaker Reception—Maren Foyer
6-8PM Dinner with Dr. Rosenthal—Dining Hall
Discussion point: Immune system and impact on decline in cardiac regeneration during aging

August 1, 2019 Thursday

9-noon Free Time: Explore on your own
12-1PM Lunch
3-6PM Lab: EKG analysis of heart function
Zebrafish Imaging
Axolotl heart analysis
6-7PM Dinner
7-9PM Regeneration review - updates on hydra, axolotls, planaria and zebrafish, Davis Classroom

August 2, 2019 Friday

9-noon Lab: tissue collection and wrapup of experiments
12-6PM FREE TIME: Explore on your own
6-10PM Lobster bake dinner celebration, Emery Cove Beach, weather permitting
Faculty tales of past trainees and famous failures

August 3, 2019 Saturday

9-noon Departure, housing units **must be vacated by 9am**. Luggage can be stored in the dining hall while you wait for ground transport to the airport.