

RECENT ADVANCES IN CONSERVATION GENETICS

Syllabus August 17-30, 2002

Saturday, 17 August

7:00 PM

BUFFET DINNER

8:30

Welcome/Orientation

- Stephen J. O'Brien, Chief, Laboratory of Genomic Diversity, LGD/NCI
- Jan Martenson, Course Coordinator, LGD/NCI

Sunday, 18 August, Day 1

7:15 AM

BREAKFAST

8:15-10:00

Evolution of Molecular Techniques - Historical Perspective

- Stephen J. O'Brien, Chief, Laboratory of Genomic Diversity, LGD/NCI

10:15-12:00

Student Presentations Session I

NOON

LUNCH

1:00-3:30

CRC tour

4:00- 5:30

Student Presentations Session II

7:00 PM

DINNER

8:15

Plenary Lecture: "Tracking Marine Turtles with Molecular Markers"

- Brian Bowen

Monday, 19 August, Day 2

7:15 AM

BREAKFAST

SAMPLE/DNA COLLECTION & PRESERVATION

8:15 -8:45

Sample collection: Introduction & Case Studies

- Warren Johnson, LGD/NCI

8:45 - 9:45

Sample Collection: Preservation, DNA extraction, "Difficult DNAs"

- Phil Morin, Laboratory for Conservation Genetics, Leipzig, Germany

10:00-10:45

Sample Collections: Ancient DNAs

- Gila Kahila Bar-Gal, LGD/NCI

11:00- noon

Genetic Foundations for Setting Conservation Priorities

- Brian Bowen

NOON

LUNCH

1:15 - 2:15

Introduction to PCR & Microsatellites: Considerations, Optimizations

- Victor David LGD/NCI

2:30 - 3:45

1. Cloning PCR products

- Jennifer Troyer LGD/NCI

4:00 - 5:15

2. STR Library Construction

- Marilyn Raymond LGD/NCI

7:00 PM

DINNER

8:15

Plenary Lecture: "Genome Projects for Endangered Species? Examining the Interface between the Utilization and Conservation of Biological Diversity in the Genomics Era"

- Oliver Ryder, CRES/SDZ

Tuesday, 20 August, Day 3

7:15 AM

BREAKFAST

8:15-noon

NCBI INFORMATION RESOURCES

- Renata McCarthy Geer, National Center for Biotechnology Information

- Wayne Matten, CSS, NCBI

NOON**LUNCH**

1:15 - 5:15

Computer Lab: Sequence Manipulations

Primer Design 101

- Bill Murphy, LGD/NCI

Alignments (CLUSTAL & GCG)

- Jill Slattery, LGD/NCI

Sequencher

- Al Roca, LGD/NCI

GIVE PROBLEM SETS

7:00 PM

DINNER

8:15

Plenary Lecture: "Evolution and Conservation of a Rainforest Fauna"

- Craig Moritz, University of California, Berkeley

Wednesday, 21 August, Day 4

7:15 AM

BREAKFAST**GENE FLOW**

8:15 - 9:30

Analysis of Population Structure & Dispersal in Fragmented Populations

- Bob Vrijenhoek, Monterey Bay Aquarium Research Institute

9:45 - 10:45

Genetics and migration in a non-equilibrium world

- Craig Moritz

11:00 - 12:00

Roundtable: "Subspecies Recognition: How Important Are They?"

- Vrijenhoek, Moritz, O'Brien, Morin, Waples

NOON**LUNCH****SEQUENCE & STR DETECTION METHODS**

1:15-2:30

Identifying SNPs, Genotyping Technologies - automated detection

- Phil Morin

2:45-4:00

Non-automated Detection, including SSCP

- Marilyn Raymond

4:15-5:30

Automated DNA Detection Methods; fluorescent labelling (ABI-310)

- Victor David

7:00 PM

DINNER

8:15

Plenary Lecture: "Molecular Diversity & Evolution of Hydrothermal Vent Communities: Threatened Oases in a Deep-sea Desert"

- Bob Vrijenhoek, Monterey Bay Aquarium Research Institute

Thursday, 22 August,]

- 7:15 AM **BREAKFAST**
- PHYLOGENETICS**
- 8:15 - 8:30 Components of Phylogenetic Reconstruction: Applications for
- Jill Slattery, LGD/NCI
- 9:45 - 12:00 PAUP overview
- Jim Wilgenbusch, Florida State University
- NOON LUNCH**
- 1:15 - 5:15 **Computer lab: PAUP**
- Jim Wilgenbusch
- 4:30? present problem sets
- Jill Slattery, Warren Johnson
- 7:00 PM **DINNER**
- 8:15 **Plenary Lecture: "Current vs Historical Diversity in Pacific Salmon? What have we lost?"**
- Robin Waples, NOAA, NMFS, Seattle, Washington

Friday, 23 August, Day 6

- 7:15 AM **BREAKFAST**
- 8:15 - 9:15 New Technologies: Genomic Prospects for Population Assessment (STR, SNP, indels)
- Mike Smith, SAIC, NCI-FDRDC
- 9:30 Live animal anesthesia, tissue sampling & processing
- Mitch Bush, CRC vet & staff
- NOON LUNCH**
- 1:15 - 5:30 **Computer lab: STR DATA ANALYSIS**
Genotyper
- Victor David
Cervus: Paternity Program
- Warren Johnson
GeneClass, Which Run
- Warren Johnson
Kinship/Relatedness
- Warren Johnson & Victor David
- 6:30 **PICNIC**

Saturday, 24 August, Day 7 FREE DAY!

- 8:00 AM **BREAKFAST**
-- Pick up your box LUNCH if you're off for the day
- 7:00 PM **DINNER**
- 8:15 **Plenary Lecture: "CDV outbreak in Serengeti Lions"**
- Melody Roelke, LGD/NCI

Sunday, 25 Aug

7:15 AM

BREAKFAST

8:15 - 9:00 Prevalence and Diversity of FIV in Exotic Feline Species
- Jennifer Troyer

CASE STUDY: CONSERVATION OF EX SITU & IN SITU

9:15 - 10:00 Giant Panda Biomedical Survey
- David Wildt, CRC

10:00-10:45 AM Patterns of Genetic Diversity in Remaining Giant Panda Populations
- Steve O'Brien

11:00 Giant Panda Paternity Analysis
- Victor David

NOON

LUNCH

1:15 - 5:15

Computer labs: POPULATION GENETICS

Microsat
- Carlos Driscoll, LGD/NCI
Arlequin
- Jill Slattery
MEGA
DNAsp
Introduction to Nested Clade Analysis
- Eduardo Eizirik

7:00 PM

DINNER

8:15

free time for students to work

Monday, 26 August, Day 9

7:15 AM

BREAKFAST

PHYLOGENETICS

8:15 - 9:15 Genetic Analysis of Introduced Disease: Hawaiian Birds, Avian Malaria and Invasive Mosquitoes
- Robert Fleischer, Smithsonian National Museum of Natural History

9:30 - 10:15 Resolving and Dating the Placental Mammal Radiation
- Bill Murphy, LGD/NCI

10:30 - 11:15 Bat Phylogeny and Conservation
- Emma Teeling, LGD/NCI

11:15- 12:00 Dating Estimates for Events in Lions, Pumas and Cheetahs
- Carlos Driscoll, LGD/NCI

NOON

LUNCH

GENETIC MANAGEMENT OF CAPTIVE POPULATIONS

1:15-2:15 Methods for Population Management: Pedigree Analysis, Mean Kinship
2:30 Computer lab: Population Management 2000
- Jon Ballou, National Zoological Park, Washington DC

7:00 PM

DINNER

8:15

Plenary Lecture: "Using Ancient DNA in Conservation Biology"

- Robert Fleischer, Smithsonian National Museum of Natural History

Tuesday, 27 August, Day 10

7:15 AM

BREAKFAST

8:15-9:30

ADVANCED TECHNIQUES FOR POPULATION ANALYSES

Genomic Chronometers - The Use of Genomic Data to Estimate Elapsed Time in Natural Populations

- David Reich, Whitehead Institute, MIT

9:45-11:00

Patterns of Genomic Perturbation in Human Populations - reflections

- David Reich, Whitehead Institute, MIT

11:15-12:00

Genetic Analysis of African Elephant Populations

- Al Roca, LGD/NCI

NOON**LUNCH**

1:15 - 5:15

Computer lab: ADVANCED PHYLOGENETICS

Introduction

- Bill Murphy

Phylogenetic Tests & Molecular Models

- Emma Teeling

Bayesian phylogenetics "Mr. Bayes" program

- Bill Murphy

Dating Techniques

- Eduardo Eizirik

7:00 PM

DINNER

8:15

Plenary Lecture: "Life in the Fast Lane: Functional Inferences from Rapidly Evolving Reproductive Proteins"

- Willie Swanson, University of Washington (Seattle)

Wednesday, 28 August, Day 11

7:15 AM

BREAKFAST

8:15 - 9:30

MHC; COMPARATIVE GENOMICS

Overview of MHC and Immunologic Inference

- Jeff Rossio, LGD/NCI

9:45 - 10:15

Sequence Organization in Mammalian MHC

- Naoya Yuhki, LGD/NCI

10:30 - 11:15

Cytogenetics, Comparative Genomics & Conservation

- Roscoe Stanyon, LGD/NCI

11:30 - 12:00

Comparative Gene Mapping in Mammals

- Bill Murphy, LGD/NCI

NOON**LUNCH**

1:15 - 1:45

GENOMIC APPLICATIONS

Carnivore Chromosome Evolution

- Bill Nash, H&W Cytogenetics

2:00 - 3:30

Large Insert Library Screening & Applications (BACS)

- David Monroe, SAIC, LGD/NCI

3:45 - 4:45

Computer lab: Advanced Comparative Primer Design

- Bill Murphy, LGD/NCI

free time for students to work

7:00 PM

DINNER

8:15

Plenary Lecture: "Witness for the Whales: DNA Monitoring of Whale Meat Markets in Japan and Korea"

- Scott Baker, University of Auckland, New Zealand

Thursday, 29 August, Day 12

7:15 AM

BREAKFAST

CASE STUDIES

- 8:15 - 9:45** Microsatellite Genotypes, mtDNA Haplotypes, Individual Identity and Stock Assignment in Structured Populations of Whales
- Scott Baker, University of Auckland, New Zealand
- 10:00 - 11:00** Florida Panthers: A Natural Experiment in Genetic Restoration
- Warren Johnson, LGD/NCI
- 11:15 - 12:00** Molecular Genetics of Adaptive Characteristics: Evolution of Melanism in the Cat Family
- Eduardo Eizirik, LGD/NCI

NOON

LUNCH

Short topics for discussions:

- 1:15 - 5:15
TIME LIMIT:
25 MINUTES
EACH
- Topic 1: **Tissue banks and cloning: their roles in conservation**
led by Steve O'Brien
- Topic 2: **Input on student project**
led by Brad McRae and others who volunteer
- Topic 3: **Prioritizing species recovery - how to choose 10 from 100 species at risk for informative genetics research**
led by Al Roca & Kent Prior
- Topic 4: **Letting Go: how to determine when a species is beyond salvation in a world of finite resources (time, money, space, public support...)**
led by Emma Teeling & Gary Fortier
- Topic 5: **Who owns the world's biodiversity?**
led by Eduardo Eizirik and Carlos Driscoll
- Topic 6: **Geographic, cultural, political differences in views of conservation**
led by Warren Johnson
- Topic 7: **Grants/job opportunities/careers in conservation genetics; organizing successful collaborations between developing and developed countries**
led by Jill Slattery and Warren Johnson
- Topic 8: **Modelling in conservation biology: distracting foolishness or complete waste of time?**
led by Carlos Driscoll and Eduardo Eizirik

7 something

Dinner & Party

Friday, 30 August, Day 13

8:00 - 10:00

BRUNCH

- 10 - 11 am** final evaluations/turn in course evaluations/ discussions if needed
- 12:00 on** Departures for airport