

Forensic Biology 444
Spring 2001

Jan SF '01

Lecture Syllabus:

- I DNA Structure and Chemistry (week 5/7)
 - 1. DNA Structure and Chemistry
 - 2. Replication, Transcription and Translation
 - 3. Mitochondrial DNA
 - 4. Basic Genetics (whatever not covered by Joanne)

- II DNA Recovery (week 5/14)
 - 1. DNA recovery and quantification
 - 2. Restriction Enzymes
 - 3. Electrophoresis of DNA

- III DNA Detection (RFLP) (week 5/21)
 - 1. Southern Blotting
 - 2. Autoradiography

- IV Mid-term 5/24/01 (75 points)

- V DNA Detection (PCR) (week 5/27)
 - 1. PCR amplification
 - 2. Reverse Dot Blots, STR's

- VI Population Genetics (week 6/04)
 - 1. Hardy-Weinberg
 - 2. Review for final exam

- VII Final Exam: 6-7-01 (75 points)

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Serology Instructor: Cathy Matsuoka, 529-3702

DNA Instructor: Barrie Chua-Chiaco, 529-3517

Weekly Schedule:

April 2	Week 1 Serology	<ul style="list-style-type: none">• Review syllabus• Safety Training/Quiz• Review paper• Assignment: Bring in 3 swabs of known origin for Phenolphthalein/Takayama testing due 4/10• Paper 1 due 4/10
April 10	Week 2 Serology	<ul style="list-style-type: none">• Phenolphthalein/Takayama of 3 swabs• Assignment: Phenolphthalein/Takayama Worksheet due on 4/17• Paper 2 due 4/17
April 17	Week 3 Serology	<ul style="list-style-type: none">• Origin Gel Experiment• ABO Blood typing demonstration• Assignment: ABO Blood Typing Worksheet due on 4/24
April 24	Week 4 Serology	<ul style="list-style-type: none">• Distribute Origin gel results• Distribute and begin analysis of Serology Mock case samples (phenolphthalein, Takayama, origin gels)
May 1	Week 5 Serology	<ul style="list-style-type: none">• Distribute Mock Case origin gel results• Review Serology for final exam• Assignment: Serology Mock Case Results due on 5/8• Paper 3 due 5/8
May 8	Week 6 DNA	<ul style="list-style-type: none">• Chelex Extraction of DNA unknowns• Paper 4 due 5/15
May 15	Week 7 DNA	<ul style="list-style-type: none">• D1S80 Amplification• Paper 5 due 5/22
May 22	Week 8 DNA	<ul style="list-style-type: none">• D1S80 Product Gels
May 29	Week 9 DNA	<ul style="list-style-type: none">• D1S80 result interpretation/statistics• Review DNA for final exam
June 5	Week 10 DNA	<ul style="list-style-type: none">• Laboratory Final Exam• DNA Mock Case Results due

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Point Breakdown:

15	5 papers, 5 points each
15	Blood Presumptive/Confirmatory Experiment
5	Origin Gel Experiment
5	ABO Blood Worksheet
15	Serology Mock Case
35	DNA Mock Case
<u>100</u>	<u>Lab Final</u>
200	Total

Paper Assignments:

1. Cox, M., "A Study of the Sensitivity and Specificity of Four Presumptive Tests for Blood," JFS, 36(5), Sept. 1991, pp. 1503-1511.
2. Hatch, A.L., "A Modified Reagent for the Confirmation of Blood," JFS, 38(6), Nov. 1993, pp. 1502-1506.
3. Walsh, P.S., Metzger, D.A., Higuchi, R., "Chelex 100 as a Medium for PCR-based Typing from Forensic Material," BioTechniques, 10(4), 1991, pp. 506-513.
4. Saiki, R., Gelfund, D.H., Stoffel, S. et al., "Primer-Directed Enzymatic Amplification of DNA with a Thermostable DNA Polymerase," Science, v. 239, Jan. 1988, pp.487-491.
5. Applied Biosystems, AmpliFLP D1580 PCR Amplification Kit (Product Insert), 2000, p. 1-20.

Rules of the Laboratory:

1. Students will not be allowed to participate in lab activities until they pass a laboratory safety quiz (no points). A perfect score is required.
2. Attendance is mandatory. There are no make-up labs. If a student does miss a lab they may use another individual's data (with prior consent of the instructor) but they may receive only half the points at maximum on the write-up.
3. No late papers or reports will be accepted. Assignments are due at the start of the designated lab session.
4. There is NO make-up of the final exam.
5. The instructors reserve the right to suspend any student for the laboratory period if they do not follow the below rules. The student will lose 5 points for the day. There will be no make-ups for work missed on that day.
 - Students shall be respectful to their peers and to the instructor. Derogatory, racial, or sexist comments will not be tolerated.
 - Horseplay in the lab jeopardizes the safety of the individuals involved and the other students in the lab. Such behavior is forbidden.

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Safety:

1. The wearing of a laboratory coat is mandatory when working in the lab. It is recommended that the coats be full length and white in color. These coats and their laundering are provided for you. Laboratory coats are to be removed each time you leave the laboratory.
2. Covered shoes must be worn in the laboratory. Slippers or open sandals are not allowed.
3. The wearing of appropriate gloves is mandatory when working with samples or chemicals. If handling biologicals (blood, semen, etc.) the use of eye protection with side shields is also mandatory.
4. All body fluids and body fluid stains are to be treated as if they are infectious. Never assume any body fluid is not infectious regardless of the source.
5. Wash hands frequently when handling samples or chemicals. Even though gloves are worn, hands should be washed often with disinfectant soap, especially before eating, smoking, etc. Hands are always to be washed before leaving the laboratory.
6. Each time a sample is removed from its container and examined on the benchtop, the possibility of benchtop contamination exists. Therefore, the benchtops are to be cleaned before and after use (10% bleach for biologicals.) Do not use bleach for disinfection of the hands, clothing or skin. Biological or chemical spills should be cleaned immediately.
7. Smoking, eating, drinking, or the application of make-up is prohibited in the laboratory. You should not place personal belongings on the benchtop while working. Remember to keep hands, pencils, pens, and instruments away from your face at all times.
8. Protective eye covers for UV lamp and laser work, as well as face shields and safety goggles for tasks that could potentially cause foreign objects to strike the eyes are provided. They should be used as appropriate. Safety glasses are to be worn in the laboratory at all times.
9. Chipped, broken, and contaminated glassware is to be disposed of in the broken glass containers only. These containers are not to be re-used under any circumstances.
10. Report all accidents, however minor, to the instructor immediately. This includes any spills of caustics, volatile or caustic chemicals, and body fluids.

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Hazards of the Laboratory:

All chemicals used in the laboratory offer a degree of safety risk. Care should be taken when handling any chemical. Chemical spills should be reported immediately to the instructor. If there are any questions about the hazards of any chemical refer to the MSDS.

1. Ethidium bromide- this substance may alter genetic material (mutagen).

All microorganisms, whether bacteria, fungi, or viruses, found in human blood, semen, saliva, urine, vaginal secretions, tears, tissue, or fecal matter, should be considered potentially infectious and pathogenic. Fortunately, for laboratory personnel, the mode of transmission of these microorganisms, for the most part, requires direct introduction into the blood stream such as accidental inoculation with needles or other sharp objects such as scalpels. There are however some microorganisms that can infect laboratory personnel by droplets and aerosols. This summary is by no means inclusive of all potentially dangerous microorganisms.

1. AIDS- This fatal disease is caused by the HTLV-III (Human T-cell lymphotropic virus) also known as HIV (Human immunodeficiency virus). The AIDS virus incorporates its viral genome into the host's DNA of the T-lymphocyte cells. This infection then causes the production of more viruses and the destruction of the immune system, eventually causing death. THERE IS NO CURE FOR AIDS AND IT IS ALWAYS FATAL.

Infection with the virus has been shown to occur primarily by two means: sexual intercourse and parenteral (injection by needle). It has been reported that the AIDS virus can survive outside the human body for as long as 15 days in a moist environment (i.e. liquid blood or semen). The survivability of the virus in dried stains of blood/semen/saliva, has not yet been determined, however, it can survive for several days. The risk of infection following a needle-stick with blood from a known HIV-positive patient is less than 0.5%. The risk of exposure of mucous membranes or intact skin is considerably less. Thus, proper laboratory practices and universal precautions allow the safe handling of HIV contaminated blood.

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2. Hepatitis B- In a laboratory setting, the Hepatitis B virus poses the greatest risk to the laboratory worker. Approximately 1/4 billion people are potentially infected with the virus meaning that the risk of processing infectious blood in the laboratory is high. Non-vaccinated individuals have a 6-30% chance of contracting Hepatitis B if they receive a needle-stick from infected blood.

The Hepatitis B virus may be present in blood, urine, semen, vaginal secretions, and saliva. Parenteral inoculation, droplet exposure of mucous membranes, and contact exposure of broken skin are the primary laboratory hazards. The virus may be stable in dried blood or blood components for several days and is extremely stable, resisting heating, drying, and most chemicals. An active case (~10% of the infected population) of the disease can result in jaundice, cirrhosis, and even cancer of the liver. **THERE IS NO CURE FOR HEPATITIS B.** There is a vaccine available that offers long-term immunity. See your health care provider for details.