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BIOM 227.01: Vectors and Parasites

Willard O. Granath

University of Montana - Missoula, bill.granath@mso.umt.edu

Tom G. Schwan

National Institutes of Health

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BIOM 227 Epidemiology of Vector-Borne and Parasitic Diseases

Spring semester, 2015

Instructors:

Dr. W.O. Granath, Biological Sciences, University of Montana; Office: HS 306; phone: 243-2975; email: bill.granath@mso.umt.edu

Dr. T. G. Schwan, Laboratory of Zoonotic Pathogens, National Institutes of Health, Hamilton, MT; phone: 363-9250; email: tschwan@niaid.nih.gov; UM office: HS 406

Lecture: Tu, Th 2:10-3:30PM , Room: HS 207

PLEASE TURN OFF CELL PHONES DURING CLASS

Textbook (recommended): H.F.L. Wertheim, P. Horby and J.P. Woodall. 2012. Atlas of Human Infectious Diseases, Wiley-Blackwell Publishing. (A copy will be placed on reserve in the library; a Kindle edition is also available from Amazon).

Some useful resources:

<http://www.cdc.gov/globalhealth/>

This is the address for the Center for Disease Control's (CDC) global health web site. From here, you can navigate to a variety of useful web pages.

<http://www.dpd.cdc.gov/dpdx/default.htm>

This is the address for the DPDx, a web site developed and maintained by the CDC's Division of Parasitic Diseases. Their goal is "to use the Internet to strengthen diagnosis of parasitic diseases, both in the United States and abroad." This site has some terrific images of parasites.

<http://www.who.int/en/>

This is the address for the World Health Organization's (WHO) web site. From here, you can navigate to a variety of useful web pages including world-wide coverage of current outbreaks and other timely information.

Lecture exams:

Three 1 hour midterms and a comprehensive final exam (see lecture topics for subjects to be covered on each exam).

Grading: Each of the 3 midterms and final will count equally. Your lowest grade will be dropped and your final grade will be based on averaging your 3 highest test scores.

Extra credit: Bring in and present an "infectious disease in the news" and receive 1 extra point per news story on your next test. Limited to 1 news item per lecture (details of how to do this/expectations will be described in class).

Class Goals:

The purpose of this class is to give you an overview of the major groups of parasites and arthropod-borne pathogens that infect humans throughout the world. After taking this class you should have an understanding of the biology of these organisms including their transmission and pathology. We will also discuss methods to prevent and control these diseases.

ATTENTION:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructors and/or a disciplinary sanction by the University.

All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VPSA/index.cfm/page/1321>.

SYLLABUS (l.o.=learning outcome)

<u>Date</u>	<u>Topic</u>	<u>Readings</u>
Jan.	27 General information, introduction to vector-borne and parasitic diseases l.o.: Goals and expectations of class will explained and some pertinent vocabulary will be introduced. Epidemiological methods will be discussed.	lecture
	29 Overview of the biology of blood-feeding arthropods l.o.: Understand the basic biology, life cycles, and diversity of arthropods that feed on blood and are vectors of human pathogens.	lecture
Feb.	3 Tick-borne bacterial diseases: Lyme disease (borreliosis) l.o.: Be able to describe the causative agent and transmission cycle in nature, the distribution and impact of this disease on people; understand the life cycle of Ixodid (hard) ticks.	Ch. 35
	5 Tick-borne bacterial diseases: Relapsing fever in North America l.o.: Be able to describe the causative agents and their transmission cycle in nature; understand the life cycle of Argasid (soft) ticks and clinical manifestations of human infection.	Ch. 44
	10 Tick-borne bacterial diseases: Relapsing fever in Africa l.o.: Be able to describe the causative agent, the transmission cycle in nature, and contrast the epidemiological differences between North America and Africa.	Ch. 45-46
	12 Tick-borne bacterial diseases: Rocky Mountain Spotted Fever and others l.o.: Be able to describe the causative agents, their transmission cycles in nature, and the distribution and impact of these diseases on people; understand the life cycles of the tick vectors.	Ch. 29
	17 Flea- and louse-borne bacterial diseases: plague; murine and epidemic typhus l.o.: Be able to describe the causative agents, modes of transmission, geographic distribution, life cycles of the insect vectors, and the current and historical impact these diseases have had on human populations.	Ch. 40

19 Tick-borne viral diseases: Tick-borne Encephalitis, Colorado Tick Fever; tick paralysis lecture
l.o.: Be able to describe the causative agents, their transmission cycles in nature, the distribution and prevalence of infections, and methods of protection and prevention of these and other tick-borne diseases.

24 Insect-borne viral diseases: Yellow Fever; Dengue Fever; West Nile Encephalitis lecture
l.o.: Be able to describe the causative agents, disease manifestations and transmission cycles in nature. Review for midterm (come prepared with questions).

26 Exam I; covers material from 1/27 to 2/24

Mar. 3 Parasitology as a discipline; Principles of protozoan biology
lecture

l.o.: Be able to describe the basic biology of parasitic protozoa.

5 Vector-borne protozoa: Malaria Ch. 78-81
l.o.: After this and the ensuing lecture you should be able to describe the biology of malaria in detail including the life cycles of the 4 species of *Plasmodium* infecting humans, their pathology, prevention and treatment.

10 Vector-borne protozoa: Malaria (continued); babesiosis
Ch. 78-81

l.o.: See lecture, above.

12 Vector-borne protozoa: African sleeping sickness and Chagas Disease Ch. 88, 89;
(American trypanosomiasis)
l.o.: Be able to describe the biology of hemoflagellates causing African sleeping sickness and Chagas' Disease

17 Vector-borne protozoa: Leishmaniasis; Principles of helminth (worm) Ch. 74-76;
Biology lecture
l.o.: Be able to describe the biology of human-infecting *Leishmania* species and become familiar with general parasitic helminth biology

19 Vector-borne helminths: Lymphatic filariasis Ch. 72
l.o.: After this and the next lectures you should be able to describe the biology of human-infecting filarial nematodes

24 Vector-borne helminths: River blindness, African eye worm and zoonotic filarial Ch. 82,77
infections
l.o.: See previous lecture.

26 Snail-borne helminths: Schistosomiasis Ch. 85,86
l.o.: You should be able to diagram the life cycles of *Schistosoma mansoni*, *S. japonicum*, *S. mekongi* and *S. haematobium* and be able to describe the pathological features of each.

Mar. 30 - Apr. 3: Spring Break

- Apr. 7 Other snail-borne helminths: Liver and lung flukes Ch. 64,70,
 l.o.: Be able to describe the life cycles of the liver flukes *Fasciola hepatica*,
 and *Clonorchis sinensis*, and the lung fluke, *Paragonimus westermani*.
 Review for midterm (come prepared with questions).
 71, 84
- 9 Exam II; covers material from 3/4 to 3/27
- 14 Food, water and soil-borne protozoa: *Entamoeba histolytica* (Montezuma's Revenge) Ch. 60
 and other intestinal amoeba ; *Balantidium coli*; cryptosporidiosis
 l.o.: Be able to describe the biology and pathology of intestinal amoebae, ciliates and
 cryptosporidia and understand their epidemiological significance.
- 16 Food, water and soil-borne protozoa: Intestinal flagellates: Giardiasis and lecture
 trichomonads; Tissue/intestinal apicomplexans : Toxoplasmosis, cryptosporidiosis;
 Opportunistic protozoan infections.
 l.o.: Be able to describe the biology and pathology of intestinal flagellates, apicomplexans
 and opportunistic protozoans, and understand their epidemiological significance.
- 21 Food, water and soil-borne helminths: Pinworms, whipworms and the large lecture
 intestinal roundworm of humans
 l.o.: Understand the biology of pinworms, whipworms and ascarids infecting humans.
- 23 Food, water and soil-borne helminths: Hookworms, trichinosis and the Fiery Serpent Ch. 73,6,61
 of the Nile! Aberrant nematode infections.
 l.o.: Understand the biology of hookworms, *Trichinella*, *Dracunculus* and aberrant
 nematode infections
- 28 Food, water and soil-borne helminths: Adult tapeworm infections of humans Ch. 66,
 l.o.: Become familiar with the common tapeworm species infecting the human gut. lecture
- 30 Food, water and soil-borne helminths: Juvenile tapeworm infections in humans Ch.65,68
 including brain cysticercosis and echinococcus
 l.o.: Understand the epidemiological significance of humans serving as an inadvertent host
 for larval tapeworms
- May 5 Catch-up and review for third midterm and final exam (come prepared with questions).

7 Exam III; covers material from 4/7 to 4/30

11 Final exam 1:10 - 3:10.