Person 2 person	Giardia, Cryptosporidium
Water	Giardia, Cryptosporidium, Toxoplasma (cat), Ascaris
Food	Cyclospora, Giardia, Cryptosporidium, Toxoplasma (cat), Trichinella
Zoonotic	Cryptosporidium, Giardia, Toxoplasma (cat)
Sexual	Trichomonas, Giardia, Cryptosporidium
Insect vectors	Plasmodium
Blood/organ Transplant	Toxoplasma (cat), Plasmodium
Penetration (skin)	Schistosoma, Plasmodium

Toxoplasma (definitive host is the cat)

Cyclospora (low infectious dose, prolonged diarrhea)

Trichomonas (probably most common sexually transmitted disease)

Cryptosporidium (watery diarrhea, complex life cycle)

Plasmodium (causes Malaria, transmitted by mosquito, spiking chills and fever)

Schistosoma (swimmer's itch, penetration of skin)

Gram positive bacilli :

Spore forming: Bacillus

Bacillus anthracis (causes anthrax) Infection through contact with animal furs or soil. Two plasmids: px01 codes for three sub units of anthrax exotoxin, px02 codes for the capsule, capsule is protein based (rare)

Bacillus cereus (makes enterotoxins that cause problems) create heat stable and heat labile.

Spore forming: Clostridium

C. difficile (exotoxins cause pseudomembranous colitis and diarrhea)

C. botulinum (botulism: neurotoxin, causes bilateral, top-down paralysis; problems with improperly canned food)

C. perfringens (gangrene, problem with soldiers)

C. tetani (tetanus, opposite of botulism, prolonged muscle contraction)

Non-spore forming:

Listeria monocytogenes (psychrotrophic, can cross the three protective barriers: gi tract, blood-brain barrier, and infant-placental barrier)

Corynebacterium diptheriae (diphtheria, exotoxin damages heart and neural cells)

Gram negative bacilli:

Salmonella and E. Coli (salmonella doesn't ferment lactose, E. Coli ferments lactose)

E. Coli H7-O157 (flagella 7, antigen 157, Hamburger disease, causes hemolytic uremic syndrome, causative agent of traveler's diarrhea)

Salmonella (two cause enteric fever, typhi and paratyphi, one causes enterocolitis, enteriditis.

Enterobacter spp. (in infant formula)

Campylobacter (probably the most common food-borne disease, but it's microaerophyllic, causative agent of traveler's diarrhea)

Bordatella pertussis (cause of whooping cough, mess up the cells in the respiratory tract.)

Pseudomonas (pseudomonas aeruginosa (cystic fibrosis and burn patients) and pseudomonas cepacia (cystic fibrosis and common contaminant of saline solutions)

Haemophilus influenzae (part of normal nasopharyngeal flora in adults and children, can cause meningitis, pneumonia and joint infections in children, development of vaccine has decreased cases in Canada)

Helicobacter pylori (causes stomach ulcers, produces urease which protects it from low pH)

Legionnella pneumoniae (waterborne, transmits by aerosol, not person to person, causes Legionnaires disease)

<u>Mycobacterial</u>

Mycobacterium tuberculosis (causes tuberculosis, a slow progressing pulmonary infection. transmission by aerosol, obligate aerobe, and facultative intracellular parasite) takes 4-6 weeks to see a colony on a Lowenstein-Jensen medium, use microscopy of sputum smears for first diagnosis.

Infection of tuberculosis: aerosol inhalation, bacterial multiplication in alveoli, macrophage ingestion and formation of primary complex, focus of infection on lungs, after 6 weeks, CMI is fully active and infection is under control, but some bacilli survive and may reactivate several years later.

Test for tuberculosis: Mantoux test→ tuberculin solution is injected intradermally, wait 2-3 days, and check for redness around injection site: 10 mm = positive, 5-9 mm = possible, may be reacting with other *Mycobacteria,* <4 = negative.

Atypical *Mycobacteria*: cause pulmonary disease, indistinguishable from *Mycobacterium tuberculosis*, but are highly resistant to anti-TB medication. ex. *M. kansassi, M. avium, M. intracellulare*, these give doubtful Mantoux tests. (5-9 mm)

M. marinum : skin infections

M. fortuitum: soft tissue abscesses.

Mycobacterium leprae (causes leprosy, two kinds:

Tuberculoid leprosy: visible nerve enlargement, low infectivity

Lepromatous leprosy: no nerve enlargement, high infectivity.

Spirochetes:

Treponema pallidum (causes syphilis, is a gram negative, helical bacteria)

Syphilis: primary syphilis: appearance of chancre 3-4 weeks after infection, fluid from lesion is contains bacteria which can be seen under dark-field microscopy.

Secondary syphilis: 6 weeks after appearance of chancre, generalized or local rash, mucosal lesions.

Latent syphilis: asymptomatic, cannot cause infection after 4 weeks, congenital infection may occur.

Late syphilis: causes obliterative endarteritis, can involve skin, mucosae, central nervous system, cardiovascular system and tissues.

Serology testing---- non-treponemal tests: eg. Wasserman, is non-specific, using cardiolipin as antigen, screening, positive in early stages.

treponemal tests: uses treponemal extract, is specific, used to confirm positive VDRL

Borrelia burgdorferi: Lyme disease, transmitted by tick bites, affects skin, joints, heart, and central nervous system. Use ELISA test for diagnosis. Treatment : amoxicillin

Chlamydiae

Obligate intracellular energy parasites, life cycle has two forms, elementary body (infection) and reticulate body (replication, growth)

C. trachomatis

STD chlamydia, most common in Canada and US, urethritis in men and cervicitis in women, many patients are asymptomatic

C. pneumoniae

Respiratory tract infection, usually sub-clinical

C. psittaci

Bird pathogen, can transmit to humans, pneumonia or endocarditis.

Mycoplasmas are the smallest free-living bacteria, saprophytes, are part of the normal gut flora. (fungal)

Mycoplasma pneumoniae, common cause of atypical pneumonia, common in adolescents. treatment is erythromycin or tetracycline.

Genital Mycoplasma, part of normal genital flora, may cause urethritis, epididymitis, pelvic inflammatory disease…

Depth of fungal infections: superficial, cutaneous, sub-cutaneous, and systemic

Parasitism:

degree of success of parasitism is based on:

1) prevalence in hosts
2) number of host species available
3) geographic range of host
4) number of offspring
5) available routes of transmission.

transmission is based on

1) sanitation
2) water quality
3) personal hygiene

Giardia lamblia – asymptomatic infections, growth and development retardation in children, diagnosed in stool samples, or ELISA test, treated with metronidazole.

Trichomonas vaginalis – most common sexually transmitted disease, causes vaginitis, urethritis in men, wet mounts to identify trichomonads for diagnosis, treated with metronidazole

Entamoeba histolytica- common in tropical countries, transmitted through person to person faecal-oral route, infects large intestine, may cause diarrhea, or in some cases, ameobic dysentery. Diagnosis through trophozoites or cysts in faeces. Metronidazole again for large intestinal infections and extraintestinal infections,

Toxoplasma gondii – cats are definitive host, transmitted to human through infection of livestock or from the cat, diagnosed through serological assays, (elisa?) treatment of immunocomprimised patients with pyrimethamine

Plasmodium spp. – cause of Malaria, *falciparum* is the most common and lethal form. Symptoms of malaria are spiking fevers and chills, flu-like symptoms, diagnosis with blood smears, chloroquine for treatment, though drug-resistance is a problem.

Cryptosporidium spp. – watery diarrhea, no drug treatment available, transmitted through water, person to person, or autoinfection, zoonotic

Cyclospora cayetenansis – Cyclosporiasis, low infective dose, profuse diarrhea, treatment with Bactrim, mostly transmitted through water and food.

<u>Worms</u>

Enterobius vermicularus – pinworm, eggs ingested through faecal oral route, diagnosed through scotch-tape test and treatable with pyrantel pamoate.

Trichinella spp. – transmitted through ingestion of raw meats, survives as adult in intestine, as larvae encysted in striated muscle, two kinds, spiralis and nativa.

Ascaris lumbricoides – high prevalence worldwide, transmitted through ingestion of eggs on poorly prepared food. Asymptomatic, though obstruction may occur if the worm gets too big. Diagnosed with stool sample, treated with pyrantel pamoate.

Anisakis simplex – home-prepared sushi and sashimi (raw fish) Humans are not definitive hosts, dead-end hosts. Often mistaken for appendicitis, drug treatment is not available.

Diphyllobothrium spp. – broad fish tapeworm, transmitted through consumption of poorly-cooked fish, mostly asymptomatic, but vitamin B12 deficiency occurs with pernicious anemia because the tapeworm competes for iron and vitamin B12. Diagnosed with stool sample, treated with praziquantel.

Taenia spp. – Large tapeworms transmitted through poorly cooked meats. saginata is beef and solium is pork. treated with praziquantel. Pork tapeworm can travel through blood-brain barrier and cause neurocysticercosis

Schistosoma spp. – blood flukes, free-swimming larvae in fresh water penetrate skin and develop in blood vessels. Symptoms include initial rash, fever, liver and lymph node problems. Eggs can be found in faeces or urine. Treated with praziquantel.

Study study study mycobacterial, mycoplasmal infections….. haven't done those yet, lecture 6, and first bit of lecture 7.