Hepatitis Viruses, Mycoplasma, Rickettsia, Spirochaetes, Chlamydia and Fungi

Hepatitis Viruses

Viral Family	**Picornaviridae**
Virus Name	**Hepatitis A Virus**
Viral Disease Name	**Viral Hepatitis A**
Virion Symmetry	**Naked, icosahedral**
Nucleic Acid Core	**RNA**
Nucleic Acid Strandedness	**SS**
Incubation Period	**30 days, with a range of 15 to 50 days**
Method[s] of Transmission	**Person-to-person – contact/oral, e.g., contaminated sample placed in a person's mouth (HAV is found in the stool (feces) of persons with hepatitis A.)**
Disease Characteristics	**Jaundice; fatigue; abdominal pain; loss of appetite; nausea; diarrhea; fever;**
Comments	**Once you have had hepatitis A you can not get it again. There is no chronic (long-term) infection. About 15% of people infected with HAV will have prolonged or relapsing symptoms over a 6-9 month period.**
Vaccine Notes	**Hepatitis A vaccine is the best protection; Always wash your hands with soap and water after using the bathroom, changing a diaper, and before preparing and eating food.**

Source[s]: http://www.cdc.gov/ncidod/diseases/hepatitis/a/fact.htm,
http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_a/slide_4.htm,
http://www.channing.harvard.edu/12.htm

Generic Name: Immune Serum Globulin, Human

Trade Name: Gamimune-N; GAMMAR-IV and GAMMAR-IM

Immunogenic Substrate: Human immunoglobulin; primarily IgG

Indication/Use: for treatment of Hep A, Rubeola, Ig deficiency, Varicella; primary immunodeficient states

Warnings: Determine hypersensitivity

Pregnancy Category: C

Administration: IV: swirl vial to mix: NO FOAM; ready to give in 20 minutes; use within 3 hours of reconstitution

INTRAMUSCULAR			
for Hep A: dose depends on length of visit: longer you stay, bigger the dose; repeat q 4-6 mo	for Measles: give dose within 5 days of exposure to prevent or alter course of measles	for Varicella: give dose STAT (if VZIG unavailable)	for Rubella: give dose to pregnant women who do not wish therapeutic abortion
Give in gluteal region; doses greater than 10 mL are divided into >1 injection and >1 injection site			

Generic Trade Name: Hepatitis A Vaccine

Trade Name: Havrix

Immunogenic Substrate: Inactivated HAV

Indications/Usage: Active immunization of people 2 YOA or older; travelers; military personnel; areas of high endemic rates of HAV infection; those participating in high risk sexual activity (anal intercourse); in presence of HAV outbreak; day-care employees; HCW's; those exposed to HAV

Warnings:
Anaphylaxis has been reported
Do not give during fever unless M.D. ascertains that benefits outweigh risks
Do not give to those with low platelet counts or bleeding disorders: may induce hemorrhage at injection site
May have fever after injection (> 100°F)
May develop itch and rash (< 10%)
May develop sore/stiff joints (<10%)
May cause photophobia

Pregnancy Category: C

Administration: Deltoid, IM; should be white opaque suspension -- if not discard; use no diluent: ready to use as is; for highest protection, recommend booster between ½ and 1 year after first injection; DO NOT FREEZE!!!!!! Discard frozen vaccine.

Viral Family	Hepadnaviridae
Virus Name	Hepatitis B Virus
Viral Disease Name	Viral Hepatitis B
Virion Symmetry	Enveloped
Nucleic Acid Core	DNA
Nucleic Acid Strandedness	SS and DS
Incubation Period	60-180 days; AVERAGE 100 days; 7 weeks; BUT may be much less; sources vary
Method[s] of Transmission	Bloodborne; Sexually; IVDU; or from an infected mother to her baby during birth.
Disease Characteristics	Jaundice; fatigue; abdominal pain; loss of appetite; nausea, vomiting; joint pain; About 30% of persons have no signs or symptoms. Signs and symptoms are less common in children than adults.
Comments	Infection limited to man. Blood, serum, fresh frozen plasma, packed RBC, fibrinogen, Factors VIII and IX, albumin; organ transplants, needle sticks (HCW's), tattooing instruments; may be picked up via open wound, abrasion and/or mucous membranes; may occur RARELY via aerosolization, hence, protect eyes, nose, mouth from splatter with goggles and face shields; may be transmitted by breast milk (1) HBV in milk or 2) ingestion of infectious blood from cracked nipples during nursing are two possible explanations)
Comments	Chronic infection occurs in: 90% of infants infected at birth; 30% of children infected at age 1 - 5 years; 6% of persons infected after age 5 years ; Death from chronic liver disease occurs in: 15-25% of chronically infected persons
Vaccine Notes	Hepatitis B vaccine is the best protection. If you are a health care or public safety worker, get vaccinated against hepatitis B, and always follow routine barrier precautions and safely handle needles and other sharps. Use condoms if you have more than one sexual partner. Don't use dirty needles.

Source[s]: http://www.cdc.gov/ncidod/diseases/hepatitis/b/index.htm,
http://www.channing.harvard.edu/12.htm,

Generic Name: Hepatitis B Immune Globulin (HBIG)

Trade Name: Hep-B-Gammagee

Immunogenic Substrate: Human immunoglobulin for IM use from hyperimmunized people by Hep B vaccine

Indication/Use: post-Hep B viral exposure including "needle-stick" and infants born to mothers positive for Hep B virus

Warnings: If patient has IgA deficiency, patient may make anti IgA and have anaphylactic reaction

Pregnancy Category: C

Administration: IM; for patients of needle stick, human bites (Hep B (+)) that breaks skin or intimate sexual contact with known/possible Hep B (+) people

Without Hep B Vaccine	With Hep B Vaccine
HBIG IM ASAP and within 24 hours	Check anti-Hep B titer STAT
Hep B Vaccine IM within 7 days; 2d dose 1 month later; 3d dose 6 months later	With adequate titer: no treatment With inadequate titer: HBIG one dose; Hep B vaccine one dose; two different sites, but on same visit

Infants of Hep B (+) mothers: at birth: HBIG; within 7 days: Hep B vaccine; follow with 1 and 6 months' inoculations

Generic Name: Hepatitis B Vaccine, Recombinant

Trade Name: Recombivax-HB

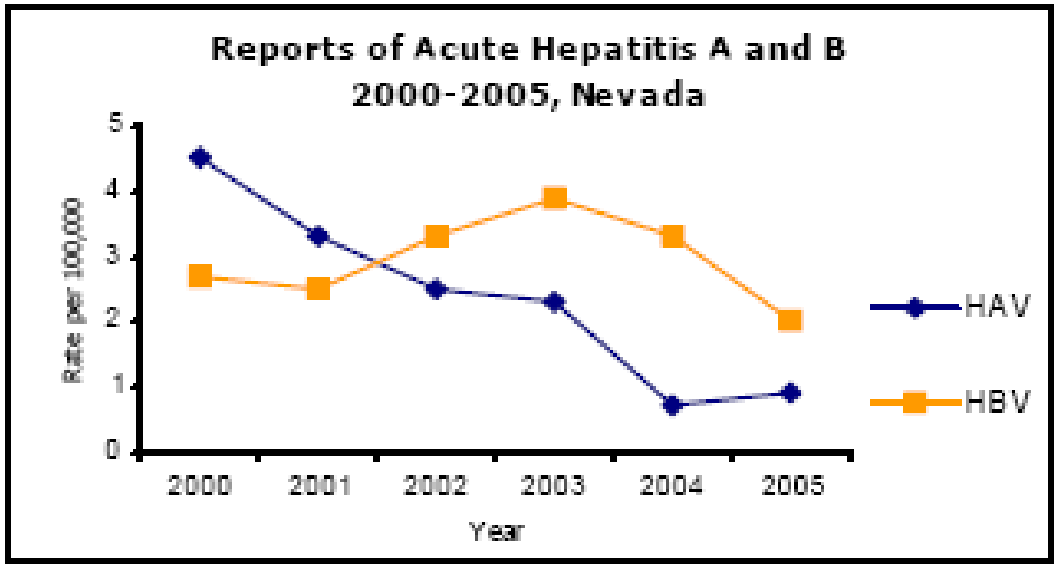
Immunogenic Substrate: derived from HBsAg from yeast cells

Indication/Use: vaccination against all subclasses of Hep B virus; for all groups at high risk of infection

Warnings: Determine hypersensitivity
Refrain from treatment if with acute illness
May have fever (at or above 100°F) and malaise, afterwards

Pregnancy Category: C

Administration: IM; Deltoid PREFERRED site -- buttocks: typically "missed", i.e., tend to be given in FAT rather than MUSCLE; anterolateral thigh muscles for infants and young children; dose depends on age: older you are, more you get per dose; give dose 1, then at 30 days, dose 2; dose three is at 6 months; double the dose for the immunocompromised patient



Most current data available from CDC.

http://www.cdc.gov/nchhstp/stateprofiles/Nevada/Nevada_Profiles.htm

In Nevada, between 1997 and 2006:

- Reports of acute hepatitis A decreased by 99% due to vaccination.
- Reports of acute hepatitis B decreased by 65%.
- Chronic hepatitis C infection reporting to CDC was initiated to improve surveillance.

Viral Family	Flaviviridae
Virus Name	Hepatitis C Virus
Viral Disease Name	Viral Hepatitis C
Virion Symmetry	Enveloped
Nucleic Acid Core	RNA
Nucleic Acid Strandedness	SS
Incubation Period	Average 6-7 weeks Range 2-26 weeks
Method[s] of Transmission	Bloodborne
Disease Characteristics	80% of persons have no signs or symptoms. Jaundice; fatigue, dark urine, abdominal pain, loss of appetite, nausea. Chronic infection: 55%-85% of infected persons; Chronic liver disease: 70% of chronically infected persons; Deaths from chronic liver disease: 1%-5% of infected persons may die. Leading indication for liver transplant
Comments	Persons at risk for HCV infection might also be at risk for infection with hepatitis B virus (HBV) or HIV. HCV is the major cause of parenterally transmitted NANB hepatitises.
Comments	NOTE: women who get HCV at 3d trimester have children who have HCV; women who get HCV during 2d trimester had NO children with HCV -- unknown why. Hepatitis occurring in a transfusion setting today is primarily Hepatitis C. Causes hepatocellular carcinoma; symptoms similar to HBV; relapsing hepatitis may recur from 6 months to 20 years after infection; average is 3.9 years; older patients are more likely to experience rapid onset of cirrhosis. Blood tests are available to differentiate between HBV and HCV.
Vaccine Notes	There is no vaccine to prevent hepatitis C. Professional safety and personal safety are paramount to prevent transmission

Source[s]: http://www.cdc.gov/ncidod/diseases/hepatitis/c/index.htm,
http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_a/slide_1.htm,
http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_c/slide_2.htm,

Viral Family	Satellite Virus (Satelliviridae? – term coined 11/24/2005, 1806 hours, PST, FSC III)
Virus Name	Hepatitis D (δ) Virus
Viral Disease Name	Viral Hepatitis D
Virion Symmetry	A defective virus that requires the helper function of HBV to replicate. HDV requires HBV for synthesis of envelope protein composed of HBsAg, which is used to encapsulate the HDV genome.
Nucleic Acid Core	RNA
Nucleic Acid Strandedness	SS circular
Incubation Period	Depends largely on whether the virus was acquired as a coinfection with hepatitis B or as a superinfection in an individual with a previously established chronic HDV infection.
Method[s] of Transmission	Bloodborne, sexually, needlestick; IVDU; during birth (as with B and C)
Disease Characteristics	Jaundice, fatigue, abdominal pain, loss of appetite, nausea, vomiting, joint pain, dark (tea colored) urine. •HDV can be acquired either as ○a co-infection (occurs simultaneously) with hepatitis B virus (HBV) or ○as a superinfection in persons with existing chronic HBV infection. •HBV-HDV co-infection: ○may have more severe acute disease and a higher risk (2%-20%) of developing acute liver failure compared with those infected with HBV alone •HBV-HDV superinfection ○chronic HBV carriers who acquire HDV superinfection usually develop chronic HDV infection ▪progression to cirrhosis is believed to be more common with HBV/HDV chronic infections Source[s]: http://www.cdc.gov/ncidod/diseases/hepatitis/d/fact.htm, http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_d/slide_1.htm, http://www.hepnet.com/update14.html
Comments	This virus is a defective virus that needs the hepatitis B virus to exist.
Vaccine Notes	Hepatitis B vaccination. Hepatitis B vaccine should be given to prevent HBV/HDV co-infection. Safety procedures. Education.

Viral Family	Caliciviridae
Virus Name	Hepatitis E Virus
Viral Disease Name	Viral Hepatitis E
Virion Symmetry	spherical, non-enveloped
Nucleic Acid Core	RNA
Nucleic Acid Strandedness	SS
Incubation Period	Average 40 days Range 15-60 days
Method[s] of Transmission	HEV is found in the stool (feces) of persons and animals with hepatitis E. •HEV is spread by eating or drinking contaminated food or water. •Transmission from person to person occurs less commonly than with hepatitis A virus •Most outbreaks in developing countries have been associated with contaminated drinking water.
Disease Characteristics	Highest attack rate among persons aged 15-40 years. Jaundice, fatigue, abdominal pain, loss of appetite, nausea, vomiting, dark (tea colored) urine. There is no chronic (long-term) infection. Hepatitis E is more severe among pregnant women, especially in third trimester
Comments	Does not occur often in the United States. HEV is the major cause of enterically transmitted NANB hepatitis.
Vaccine Notes	No vaccine available. Always wash your hands with soap and water after using the bathroom, changing a diaper, and before preparing and eating food. Avoid drinking water (and beverages with ice) of unknown purity, uncooked shellfish, and uncooked fruits or vegetables that are not peeled or prepared by the traveler.

Source[s]: http://www.cdc.gov/ncidod/diseases/hepatitis/e/fact.htm,
http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_e/slide_1.htm,
http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_e/slide_2.htm,
http://www.cdc.gov/ncidod/diseases/hepatitis/slideset/hep_a/slide_1.htm

Mycoplasma

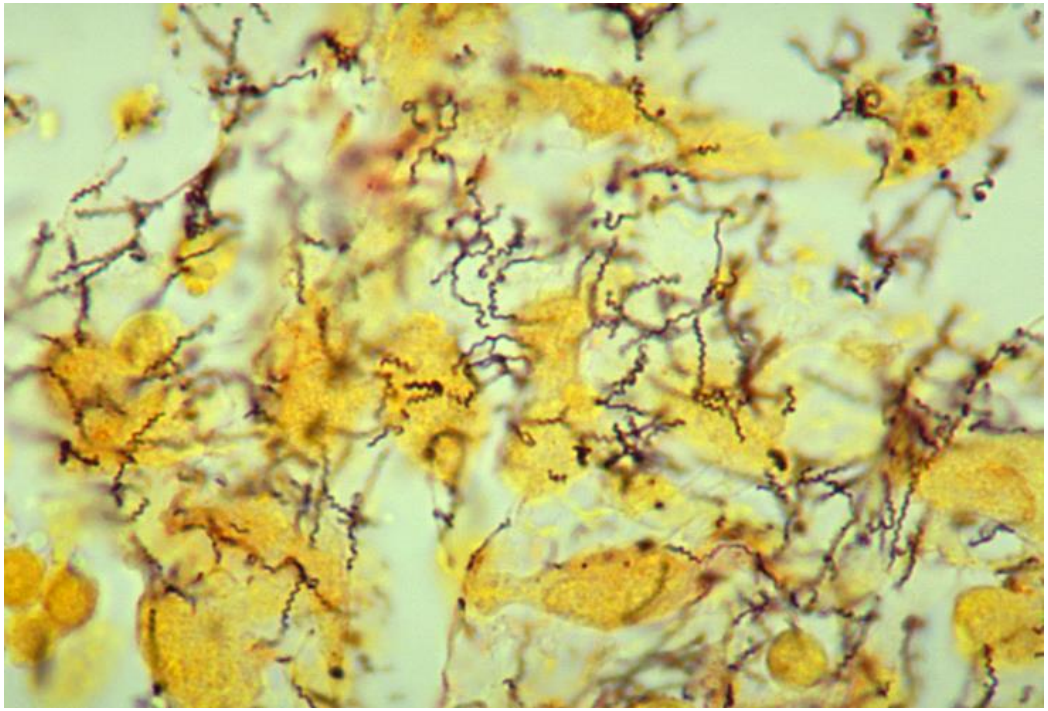
General Characteristics of Mycoplasma
1) Smallest micro-organisms that can be free-living in nature and also grown on lab media
2) Highly pleomorphic since they have no cell wall
3) Resistant to penicillin (cell wall synthesis inhibitor)
4) Have affinity for mammalian cell membranes -- ????maybe for cholesterol???
5) Inhibited by tetracycline or erythromycin (translation inhibitors)
6) Very difficult to identify by conventional methods
RULE: if the patient has a pneumonia or NGU (male) or post-partum fever (female) and no bacteria are seen on stained smears, probably a mycoplasma infection

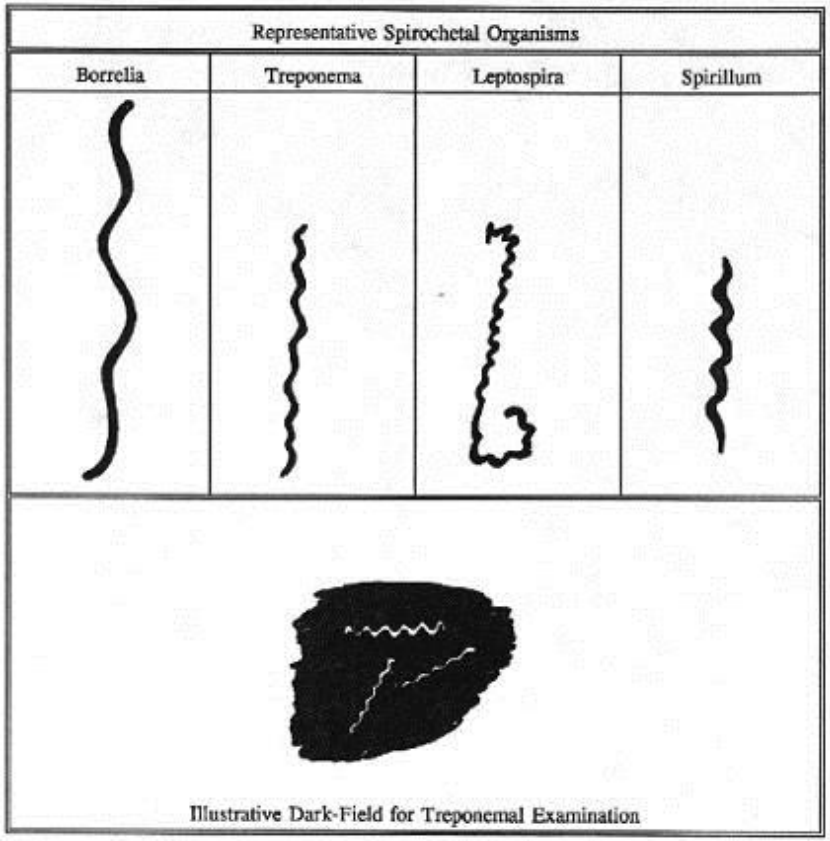
Mycoplasma: Mycoplasma pneumoniae
Gram Reaction: None: mycoplasma
Morphology: No cell wall: pleomorphic
Type of Microorganism: Airborne to lower respiratory tract
Primary Disease: Primary atypical pneumonia (PPLO); walking pneumonia
Brief Description: Dry cough, fluorescent Ab's available

Mycoplasma: Ureaplasma urealyticum
Gram Reaction: As above
Morphology: As above
Type of Microorganism: STD
Primary Disease: Ureaplasmal urethritis
Brief Description: Pain on urination; variable discharge, salpingitis leading to infertility; associated with spontaneous abortion

Mycoplasma: Mycoplasma hominis
Gram Reaction: As above
Morphology: As above
Type of Microorganism: STD
Primary Disease: Mycoplasma urethritis
Brief Description: Painful urination, variable discharge, salpingitis (inflammation of the fallopian tube) leading to infertility; associated with spontaneous abortion

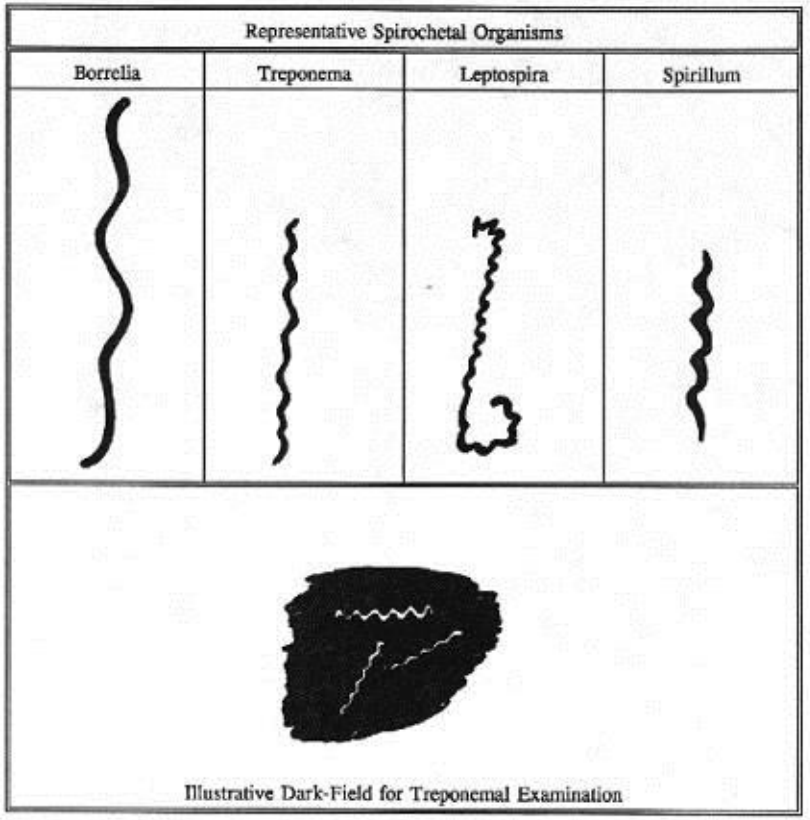
Spirochaetes, Rickettsia and Chlamydia





Note that Borrelia is the longest and has the fewest spirals per unit length and that Spirillum is the shortest, bluntest and has the sharpest ends.

- The different treponemes can be differentiated by the number of spirals per length.
- The bottom of the graphic is a representative dark-field illuminated view of what spirochetes would look like: black background and white spiral organisms.



Syphilis

SPIROCHETES

There was a young man from Black Bay — Initial infection
Who thought syphilis just went away
He believed that a chancre
Was only a canker
That healed in a week and a day. — Primary syphilis

But now he has acne vulgaris
(Or whatever they call it in Paris);
On his skin it has spread — Secondary syphilis
From his feet to his head
And his friends want to know where his hair is.

There's more to his terrible plight:
His pupils won't close in the light
His heart is cavorting, — Tertiary syphilis
His wife is aborting,
And he squints through his gun barrel sight.

Arthralgia cuts into his slumber;
His aorta is in need of a plumber;
But now he has tabes,
And saber-shinned babies,
While of gummas he has quite a number.

He's been treated in every known way,
But his spirochetes grow day by day; — Tertiary syphilis
He's developed paresis,
Has long talks with Jesus.
And thinks he's the queen of the May.

Anonymous

Bacteria: Treponema pallidum

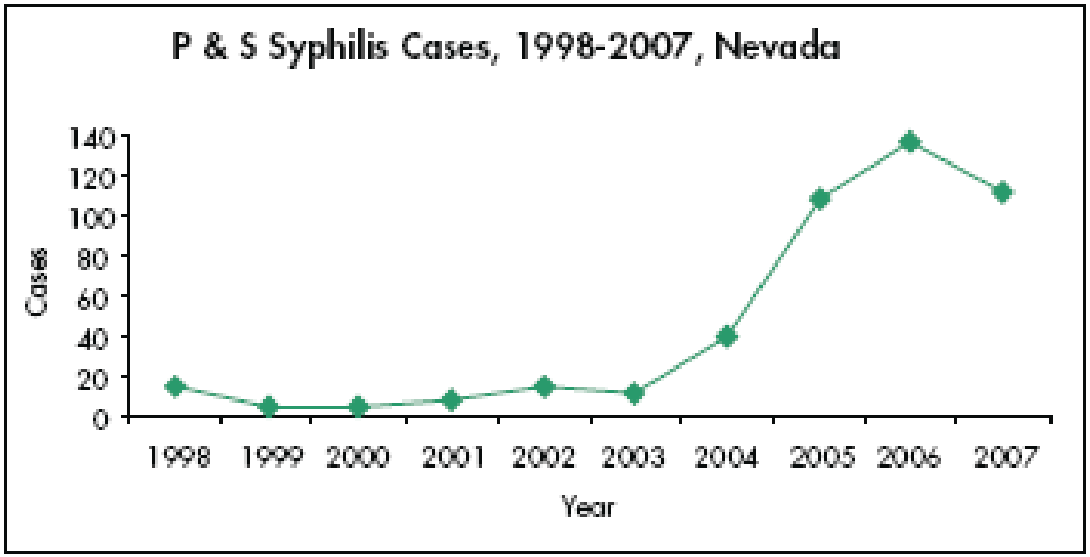
Gram Reaction: Spirochete

Morphology: Spirochete

Type of Bacteria: STD

Primary Disease: Syphilis

Brief Description: "Great imitator", chancre, gumma, various stages; congenital problem causer



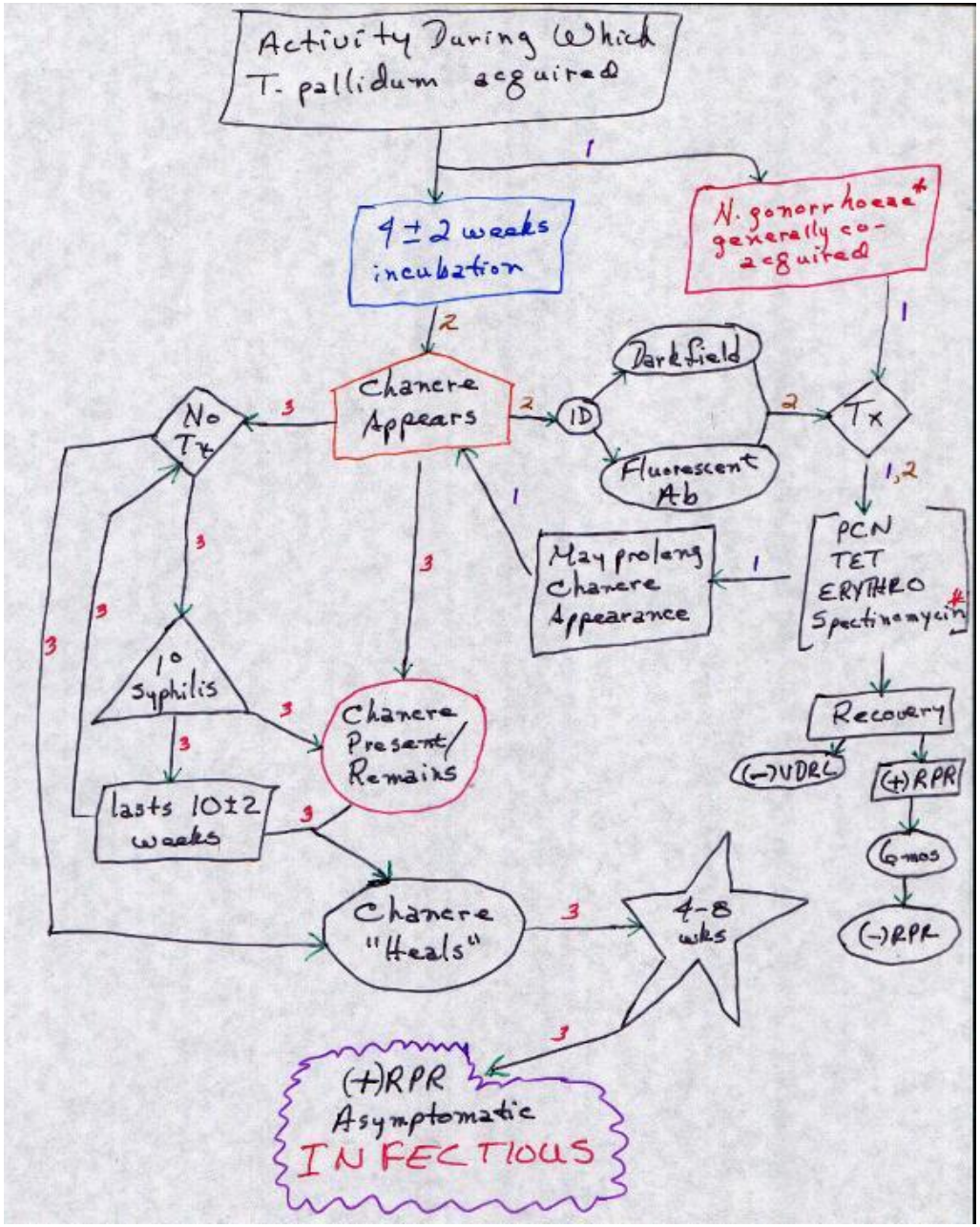
Most current available data from CDC

http://www.cdc.gov/nchhstp/stateprofiles/Nevada/Nevada_Profiles.htm

Note upswing.

Nevada ranked 12th among 50 states, with 4.4 cases of Primary & Secondary syphilis per 100,000 persons.

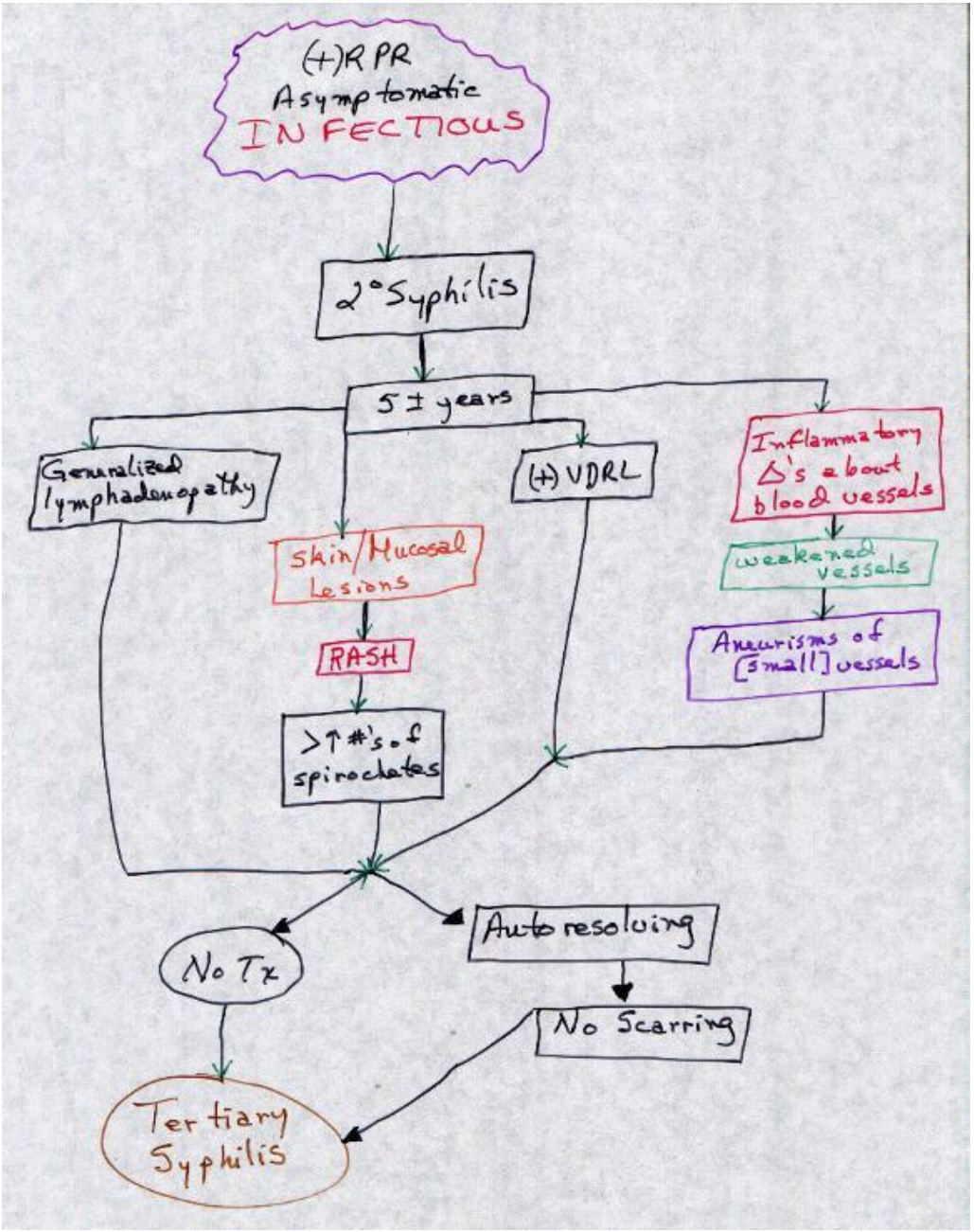
Between 1996 and 2007, Nevada reported 7 cases of congenital syphilis, 1 in 1996 and 1 in 2005 and 5 in 2007.



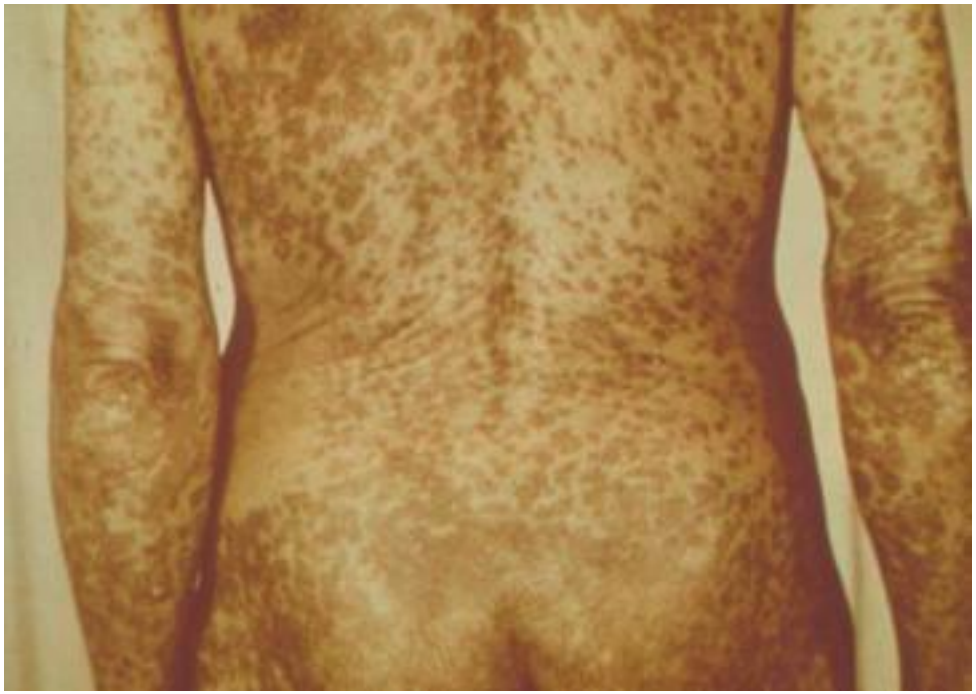
After a 4±2-week incubation, a chancre appears. Generally, N. gonorrhoeae is co-acquired and treated with PCN, TET, erythromycin or spectinomycin (treatment of choice). Recovery from N. gonorrhoeae is uneventful and the patient has a negative VDRL (serum test for syphilis) but a positive RPR (rapid plasma reagin; another test for syphilis). Within 6 months, the RPR will turn negative.

- On the other hand, the antibiotic therapy may prolong the appearance of the chancre. The organisms will need to be identified by either dark field exam or by the use of fluorescent antibodies, then treated as before.
- If the patient does not receive any treatment, he or she will develop primary syphilis and the chancre remains and lasts about 10 ± 2 weeks. Even without therapy, the chancre will appear to "heal". Within about 4-8 weeks, the RPR will be positive, the patient will be both asymptomatic and infectious.

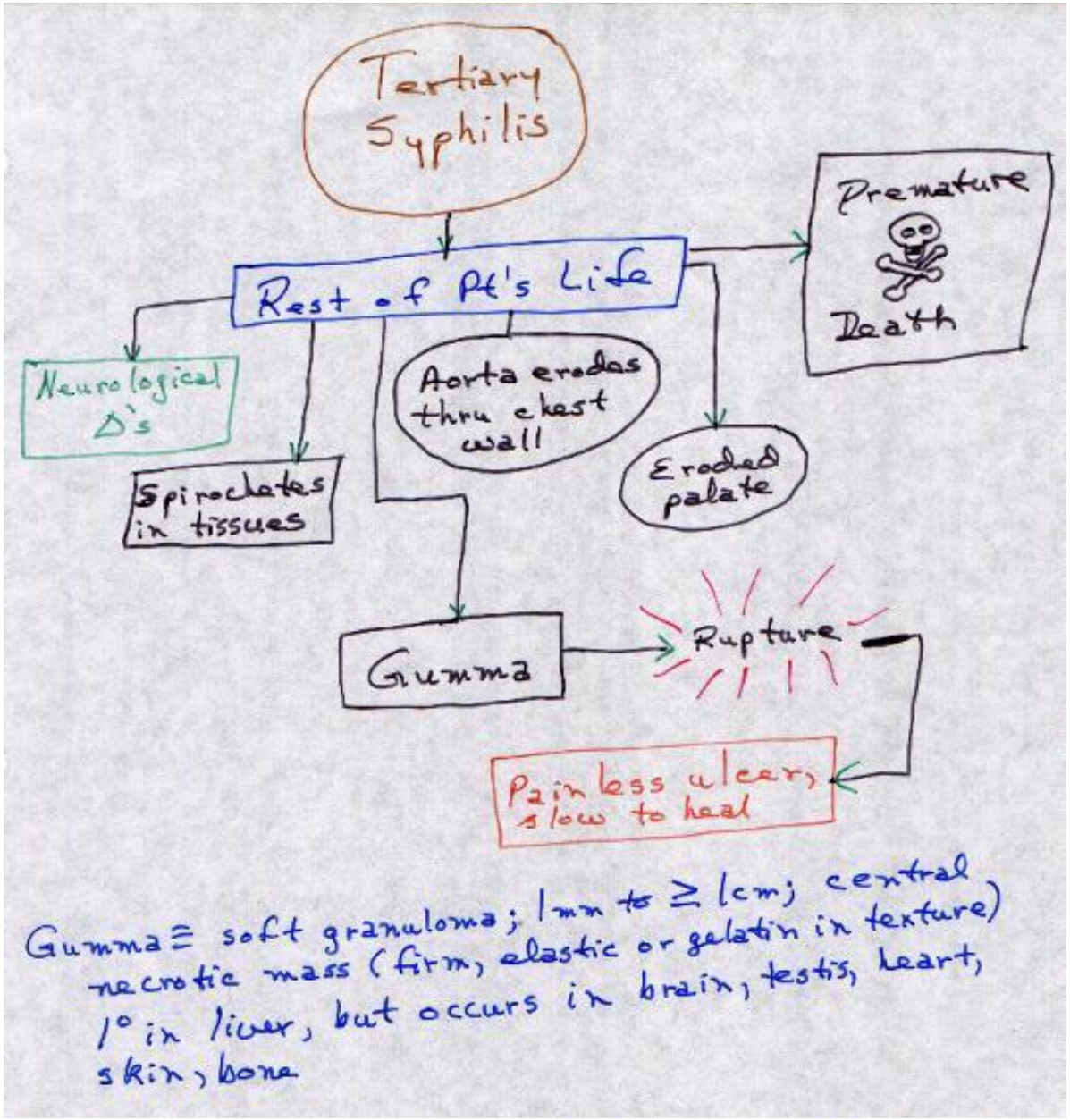
The chancre itself is painless, which explains why men and women with these continue to have sexual relations in spite of having a chancre.


(+)RPR
Asymptomatic
INFECTIOUS
2° Syphilis
5 ± years
Generalized lymphadenopathy
Skin/Mucosal Lesions
(+) VDRL
Inflammatory Δ's about blood vessels
weakened vessels
Aneurisms of [small] vessels
RASH
>↑ #'s of spirochetes
No Tx
Auto resolving
No Scarring
Tertiary Syphilis

- Continues the saga of the patient with syphilis that is untreated. The patient will automatically "fall into" secondary syphilis for around 5 or so years, during which he or she will develop granulomatous lymphadenopathy, a positive VDRL, inflammatory changes about the blood vessels and skin and mucosal lesions.
- The lesions will develop into the classical secondary syphilitic rash that is loaded with large numbers of spirochetes. The inflammatory changes about the blood vessels will weaken some vessels and cause aneurysms of small blood vessels.
- Without therapy, the patient will move into tertiary syphilis. Without therapy, some of the secondary syphilitic characteristics will auto-resolve without scarring. This will not prevent the patient from moving into tertiary syphilis.



Secondary Syphilitic Rash. Not seen much these days, due to the utilization of antibiotics. Syphilis is sometimes called the "Great Pretender" as it can mimic other skin diseases. If you notice, most dermatologist don't shake hands much with their patients This is because the spirochaetes of T. pallidum are in these skin lesions and are easily communicated between patient and physician.



Gumma ≡ soft granuloma; 1mm to ≥ 1cm; central necrotic mass (firm, elastic or gelatin in texture) 1° in liver, but occurs in brain, testis, heart, skin, bone

- Tertiary syphilis lasts the rest of the patient's life and includes neurological changes, spirochetes in the tissues, aorta eroding through the chest wall, palatal erosion and premature death. The patient will also develop gummas that eventually rupture to form painless, slow to heal ulcers.
- Gummas are soft granulomas, 1 mm to more than 1 cm in diameter. They have a central necrotic mass (firm, elastic or gelatin in texture) primarily in the liver, but occurs in brain, testis, heart, skin and bone.

Bacteria: Borrelia burgdorferi

Gram Reaction: None -- spirochete

Morphology: Spiral

Type of Bacteria: Arthropod borne -- tick

Primary Disease: Lyme Disease

Brief Description: Bull's eye at bite; arthritis; most prevalent tick-borne disease

Bacteria: Leptospira interrogans icterohaemorrhagiae

Gram Reaction: None

Morphology: Spirochete

Type of Bacteria: Rodent urine/feces; from contaminated food/water; contact of broken skin with rodent excreta

Primary Disease: Leptospirosis

Brief Description: Infectious, hemorrhagic, spirochetal jaundice, muscular pain, fever, hepatosplenomegaly

Treat with PCN-G or TET IV in LARGE doses at BEGINNING of disease

Bacteria: Spirillum minus

Gram Reaction: None

Morphology: Aerobic flagellated spirochete

Type of Bacteria: Rodent's (rats/mice) blood -- rat bite or contaminated milk

Primary Disease: Rat-bite fever

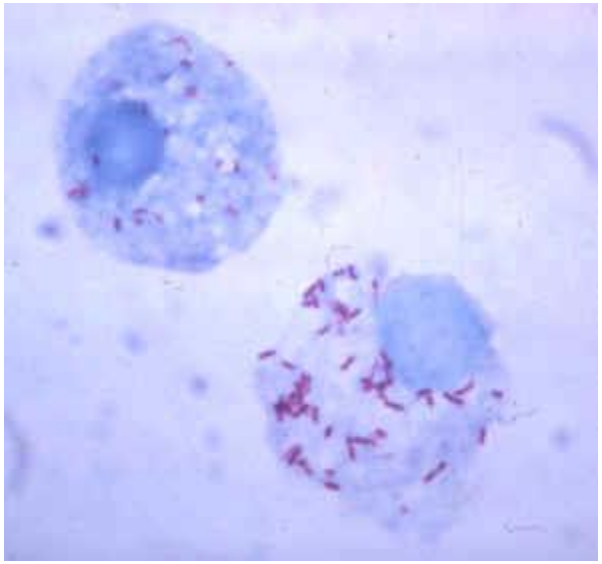
Brief Description: Skin inflammation; headache; N/V; back and [joint pain (arthritis)]; ulcerations, [rash], [prolonged/recurrent fever]

Spirillum minus rare in U.S.

[Streptobacillus moniliformis is the primary cause of rat bite fever in the U.S.; Gram negative rod]

Treatment: PCN

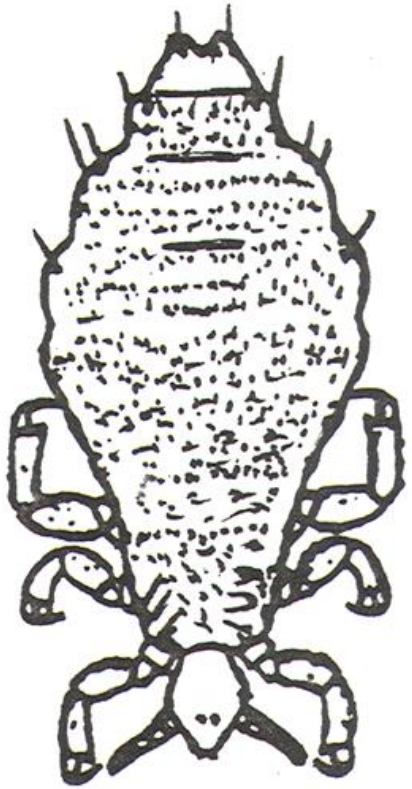
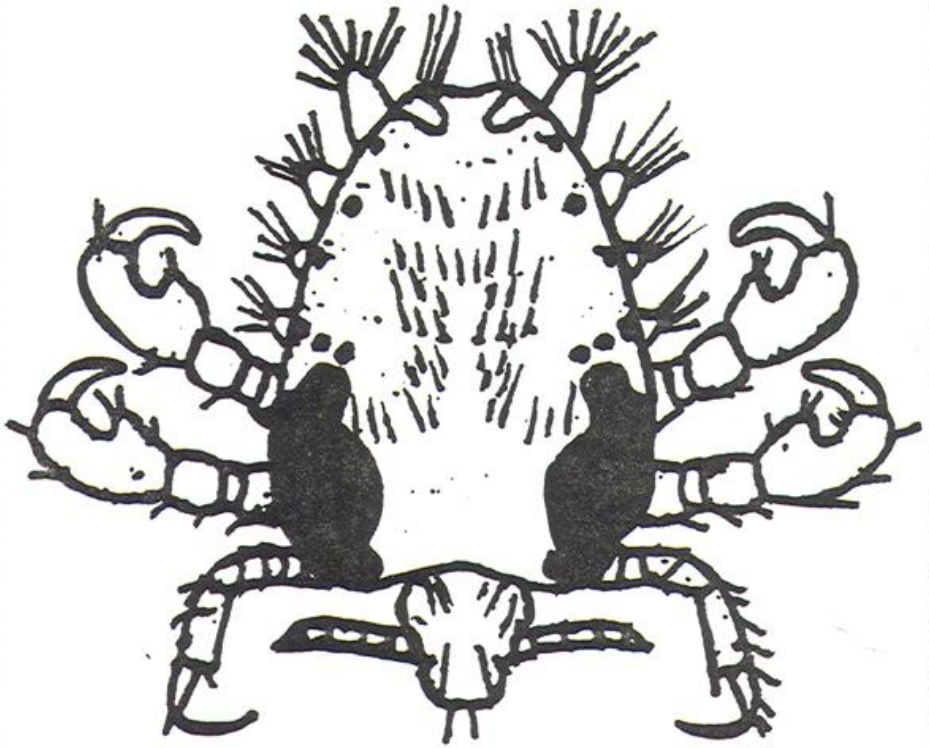
Rickettsia



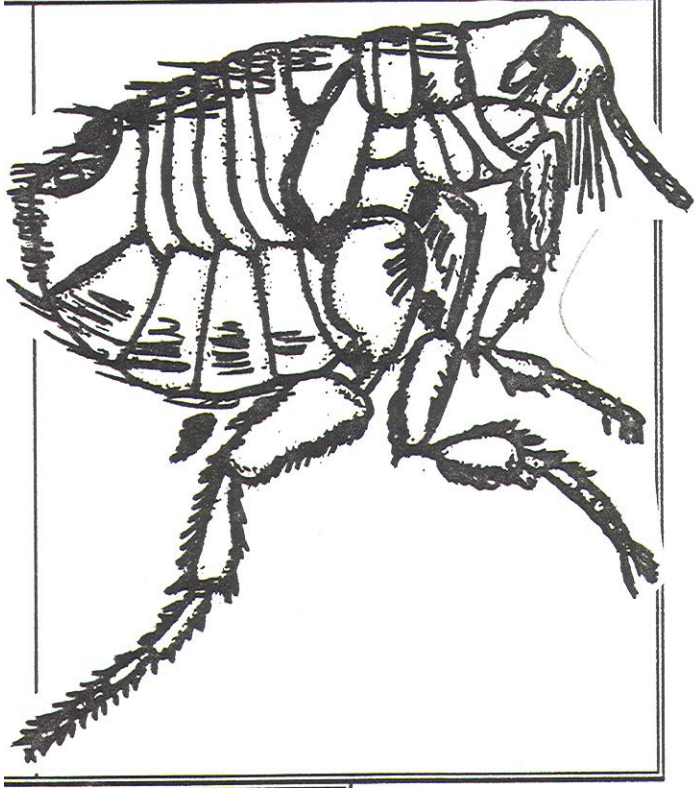
Rickettsia
1) Short rods OR cocci, i.e., pleomorphic
2) Singly, pairs, short chains, filaments
3) Blue with Giemsa; red cell with Macchiavello's, blue cytosol of cells in which appear
4) Resemble cell walls of Gram negative cells
5) Typhus: in cytosol Spotted fever: in nucleus Q fever: in cytoplasmic vacuoles Trench fever: ? but has been grown on cell free medium -- this organism is the most resistant to drying

- Rickettsia are coccobacillary in shape, averaging about 0.3 X 0.3 X 0.5 microns. They are uniformly gram negative with buffered dye and mordant. Macchiavello's dye is buffered fuchsin, citric acid solution and methylene blue.
- The history behind rickettsia is that they were thought once to be between viruses and bacteria. That was tossed out once it was discovered that 1) rickettsia multiply by binary fission, 2) they have both DNA and RNA, 3) they contain muramic acid, 4) they contain the TCA enzymes, ETS enzymes and enzymes of protein synthesis and 5) growth is inhibited by antibacterial agents.

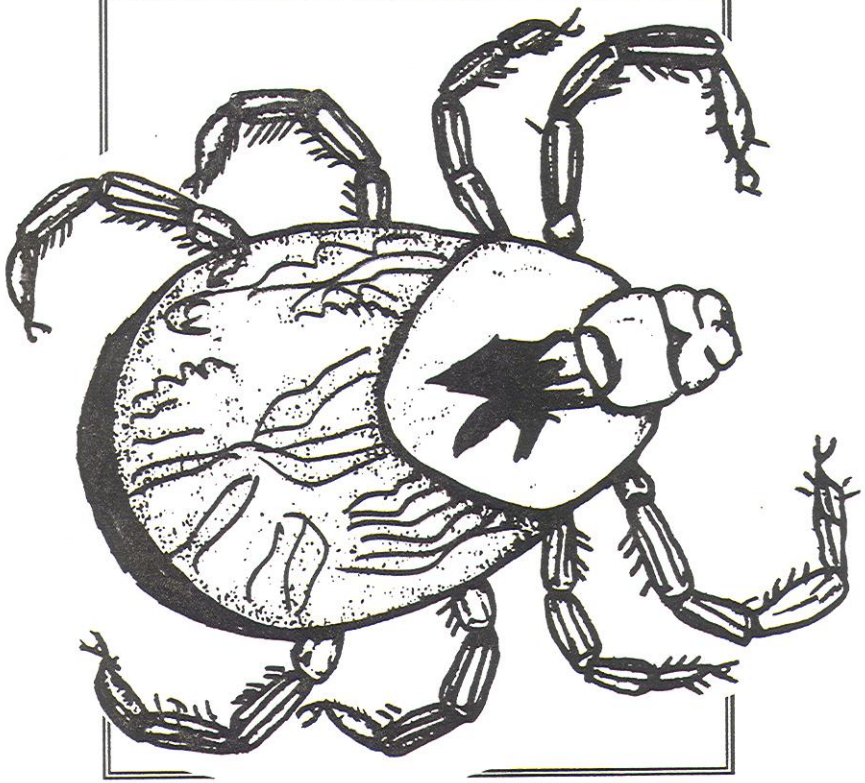
- Rickettsia prefer endothelial cells of small blood vessels. They cause angiitis. This angiitis accounts for the petechial rash (due to inflammation, obstruction of vessels and RBC leaked into tissues).

Body/Head Louse (Pediculus humanus)	Crab Louse (Phthirius pubis)
	
Legs equidistant, more or less; long abdomen; few hair processes on lateral abdomen	First legs shorter than last two pair; lateral abdominal hair processes; "scrunched" abdomen

Rat Flea



Hard-shell Tick



Bacteria: Rickettsia rickettsii

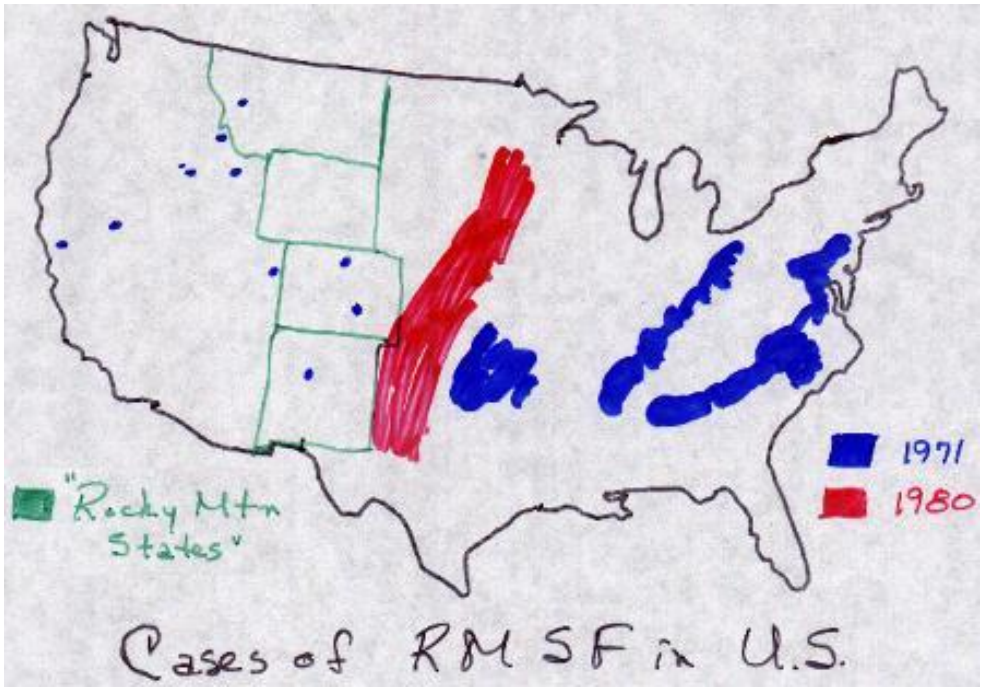
Gram Reaction: Rickettsia

Morphology: Rickettsia

Type of Bacteria: Arthropod borne (tick); in W. hemisphere; affects rodents, dogs and humans

Primary Disease: Rocky Mountain Spotted Fever (RMSF)

Brief Description: Fever, rash: first on wrists/ankles and 2d on palms and soles, thence to legs, arms, trunk and face; rash does NOT itch; most common rickettsial disease



Science has a sense of humor. This graphic shows that the vast majority of cases of Rocky Mountain Spotted Fever were well east of the states that contain the Rocky Mountains during 1971 and 1980.

Image leading into Rickettsia lecture is R. rickettsii.

Bacteria: Rickettsia akari

Gram Reaction: Rickettsia

Morphology: Rickettsia

Type of Bacteria: Mite borne (house mouse carrier); U.S., Korea, USSR, Africa; affects mice and humans

Primary Disease: Rickettsial pox; 9-14 day incubation; 2d most common rickettsial disease in US

Brief Description: Acute, febrile, self-limiting disease; black eschar at site of mite bite; rash very similar to chicken pox

Bacteria: Coxiella burnetii (great resistance to drying, heat, physical/chemical treatments and is highly infectious to humans)

Gram Reaction: Rickettsia

Morphology: Rickettsia

Type of Bacteria: Dust inhalation; unpasteurized milk; worldwide; affects cattle, sheep, goats, humans

Primary Disease: Q fever; 26+/-12 days incubation

Brief Description: EXCEPTION TO RICKETTSIAL DISEASES: NO RASH; headache; fever; sweating profusely; myalgia, anorexia, cough, chest pain

Chloramphenicol and TET effective treatment

Bacteria: Rochalimea quintana

Gram Reaction: Rickettsia

Morphology: Rickettsia

Type of Bacteria: Body louse-borne; rare EXCEPT for in jails, armies, refugee camps; affects humans

Primary Disease: Trench fever

Brief Description: Fever, headache, malaise, exhaustion, "shin-splints" type of pain; splenomegaly; cold extremities; with roseolar rash

Sensitive to TET and Chloramphenicol in vitro, BUT no evidence that they work in vivo

Bacteria: Typhus group

Gram Reaction: Rickettsia

Morphology: Rickettsia

Type of Bacteria: Louse, flea, mite-borne; during famines, wars, catastrophes; affects humans and rodents; S. America, Africa, Asia, World wide, SE Asia, Japan

Primary Disease: Typhus

Epidemic	Murine	Scrub
1-2 week incubation	Not as severe	6-21 day incubation

Brief Description: Great prostration, pounding headache, general rash, high, prolonged fever (104-105°F by day 2 or 3 and lasts for 10 days); ends by crisis within 10-14 days; tongue covered with white fur; picking at bedclothes; day 4-5, blue spots appear on abdomen: petechial, remain even after pressure applied, the worse the case, the greater the eruption of these spots; constipation; more often fatal when > 40 YOA; RASH GOES OPPOSITE OF RMSF, USUALLY SPARING FACE, PALMS, SOLES

Treatment: TET and Chloramphenicol give excellent results

Weil-Felix Reaction

- The Weil-Felix reaction requires the utilization of a patient's serum and one to three different kinds of Proteus spp. The serum and one of the three bacteria are mixed on a microscope slide and examined for the presence of clumping. Clumping of the bacteria is positive and indicates the presence of anti-rickettsia. A negative reaction does not necessarily mean that the patient has no anti-rickettsia -- it just means that other rickettsia may be the cause of the disorder or not.

Weil-Felix reaction for Anti-Rickettsia	
Serum + Proteus OX19, OX2, or OXK bacteria	
↓	
Mix on  microscope slide	
↙	↘
	
No clumping of bacteria; NEGATIVE reaction	Clumping of bacteria; POSITIVE reaction
With clumping, are probably anti-rickettsia present which suggests rickettsial disease; BUT if there is NO clumping, this does not R/O rickettsial disease (SEE BELOW)	

Some Weil-Felix Reactions			
	OX19	OX2	OXK
RMSF	+	+	-
Rickettsial pox	-	-	-
Q fever	-	-	-
Trench fever	?	?	?
Typhus:			
Epidemic	+	+/-	-
Murine	+	-	-
Scrub	-	-	+

- Cat Scratch Fever
- Cat Scratch Disease (CSD) is also called Cat Scratch Fever and benign lymphoreticulosis. [http://pets1st.ca/articles/00045catscratchdisease.asp]
- Caused by: ***Bartonella henselae*** (used to be called ***Rochalimaea henselae;*** a rod-shaped Gram negative organism formerly placed in the genus *Rochalimaea.*) [http://www.kcom.edu/faculty/chamberlain/Website/lectures/lecture/catfever.htm]
- Incubation period of 1-2 weeks.

- **DIAGNOSIS**
- A clinical diagnosis of "classical" CSD is made if 3 of the following 4 criteria are met:
- history of cat contact resulting in a scratch or primary lesion of the dermis eye, or a mucous membrane;
- a positive skin test response to CSD skin-test antigen or positive indirect fluorescent antibody test to detect *B. henselae*. This indirect fluourescent antibody test is highly specific. Unfortunately, it can be less than 50% sensitive.
- negative laboratory investigation (i.e., PPD skin tests and cultures of aspirated pus or lymph nodes) for unexplained lymphadenopathy;
- and characteristic lymph node lesions.
- and Parinaud's oculolandular syndrome.

- Parinaud's oculolandular syndrome
- Conjunctivitis with pre-auricular lymph nodes that are palpable.

- “pink eye with lumps in front of your ears”

- [http://www.medhelp.org/Medical-Dictionary/terms/1/000736.htm]

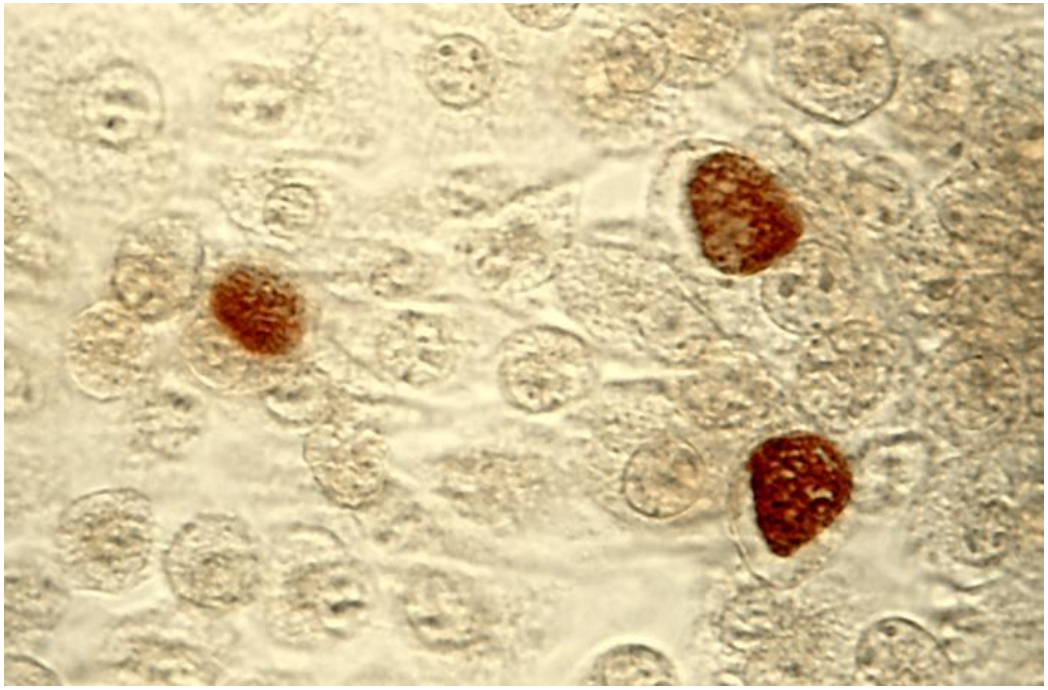
- **THERAPY**
- CSD= Efficacy of therapy not proven. Although not necessary, there may be some clinical benefit to using antibiotics, such as azithromycin, to treat classic CSD (3). Symptomatic care for most patients is indicated. Swollen lymph nodes will resolve in 1-6 months. The infection will resolve in 90% of the patients without treatment. *If lymph node swelling is extensive recent suggestions for treatment include: azithromycin 500 mg daily for 1 week, then 250 mg once daily for 4 weeks.
- *Retinitis- Doxycycline 100 mg twice daily + rifampin 300 mg twice daily x 4-6 weeks.
- *Endocarditis- culture positive- Doxycycline 100 mg orally twice daily for 6 weeks + gentamicin 3 mg/kg/d intravenously for 14 days.
- Antibiotics can be of benefit in cases of severe disease (encephalopathy); rifampin, ciprofloxacin, trimethroprim/sulfamethoxazole, erythromycin, clarithromycin, or azithromycin.
- *Immunocompromised hosts with bacillary angiomatosis - Erythromycin 500 mg once daily for 3 months
  or doxycycline 100 mg twice daily for 3 months.
- *Immunocompromised hosts with peliosis hepatica- Erythromycin 500 mg once daily for 4 months *or* doxycycline 100 mg twice daily for 4 months.

- Bacillary angiomatosis: A life-threatening but curable infection that causes an eruption of purple lesions on or under the skin that resemble **Kaposi's sarcoma**. The infection, which occurs almost exclusively in patients with **AIDS**, can be a complication of **cat-scratch disease**.

- Scientists have recently isolated two varieties of the Bartonella bacteria as the cause of bacillary angiomatosis: *Bartonella* (formerly *Rochalimaea) quintana* and *B. henselae* (cause of cat-scratch disease).
- *B. quintana* infection is known popularly as **trench fever**, and is the infection associated with body lice that sickened European troops during World War I. Lice carry the bacteria, and can transmit the infection to humans. The incidence of trench **fever** was believed to have faded away with the end of World War I. It was not diagnosed in the United States until 1992, when 10 cases were reported among homeless Seattle men.
- The related bacteria *B. henselae* was first identified several years ago as the cause of cat-scratch fever. It also can lead to bacillary angiomatosis in AIDS patients. Bacillary angiomatosis caused by this bacteria is transmitted to AIDS patients from cat fleas.

- peliosis hepatica-
- Multiple blood filled cysts in liver or spleen
- Associated with steroids (anabolic, contraceptive), danazol, azathioprine, Bartonella henselae infection in HIV+ patients
- Also associated with liver or renal transplants, Castleman's disease, nodular regenerative hyperplasia, leukemia / lymphoma, vinyl chloride exposure
- Usually incidental finding at autopsy, but may cause fatal intra-abdominal hemorrhage
- May be due to hepatocellular necrosis, veno-occlusive disease
- **Treatment:** erythromycin or doxycycline for Bartonella henselae infections
- **Gross:** honeycombed liver with multiple round, red-purple, blood filled spaces, 0.2 to 5 cm
- **Micro:** blood lakes surrounded by hepatic cords with variable endothelium; spaces may be continuous; sinusoidal dilation away from pools; may have herniation of hepatocytes into central veins; also fibrosis, organizing thrombus, hepatocellular necrosis; B. henselae patients have small blood vessel proliferation and spindle cells in liver and spleen
- **Positive stains:** Warthin-Starry (Bartonella henselae infection / bacillary angiomatosis in HIV patients)
- [http://www.pathologyoutlines.com/liverpf.html#peliosishepatis]

Chlamydia
(C. trachomatis below)



Chlamydiae
1) Obligate intracellular parasites
2) Related to Gram negative bacteria
3) Are not able to synthesize their own ATP
4) Lysozyme has no effect on chlamydiae
5) Cell wall formation inhibited by PCN
6) Detection: fluorescent Ab staining in vacuoles
7) Giemsa: Purple Macchiavello: red *vs* cytoplasmic blue Gram: not useful Immunofluorescence: brightly stained

Bacteria: Chlamydia trachomatis

Gram Reaction: ------

Morphology: Chlamydiae

Type of Bacteria: STD

Primary Disease and Characteristics:

Chlamydial urethritis	Newborn pneumonia	Proctitis	Salpingitis
STD	During birth	STD	STD
pain on urination; watery discharge; 3-5*10^6 cases annually	inflammation of the lungs; high fever; chest pain; cough; purulent sputum; mortality high without appropriate treatment	inflammation of the rectum and anus; mucous, blood or pus may be present; tenesmus +/- (painful, spasmodic contraction of the anal/vesical sphincter with pain and desire to void; also involuntary straining efforts that are ineffective)	leads to infertility; inflammation of Fallopian tube

Fungi

Source: http://users.michweb.net/~air/fungi.jpg

Fungus: Malassezia furfur
Type: Superficial Mycosis
Disease: Tinea versicolor
Appearance: Lesions on chest, back, abdomen, neck and upper arms; lesions range from depigmented to brownish-red
Treatment: 1% SeS q od X 15' and then washed off

Fungus: Exophiala werneckii
Type: Superficial mycosis
Disease: Tinea nigra
Appearance: Light brown/black macula on palmar or plantar S. corneum
Treatment: Remove infected S. corneum chemically or mechanically

Fungus: Piedraia hertae ------Trichosporum cutanaeum
Type: Superficial mycoses
Disease: Piedra
Appearance: Hard black nodules around scalp hair ------ Softer white to light brown nodules form on axillary, pubic, beard and scalp hair
Treatment: Shave hair off

Fungus: Trichophyton species (primarily affects adults)
Type: Cutaneous
Disease: Ringworm and as follows
Appearance: Comes from cats, dogs, hair clippers, person to person
Treatment:

T. mentagrophytes	Ringworm of hairless skin; circular patches that heal from the center out; itch; a.k.a. tinea corporis, tinea cruris, tinea capitis, tinea unguium, tinea barbae
T. rubrum/ mentagrophytes	athlete's foot; Acute phase: itching red vesicles; Chronic phase: itching scales with splitting of skin; a.k.a. tinea pedis
T. rubrum/ mentagrophytes	also jock itch

Scalp ringworm	remove hairs; griseofulvin for 1-2 weeks
Body ringworm	miconazole cream, undecylenic acid, salicylic acid, benzoic acid
Foot ringworm	Acute: $KMnO_4$ 1:5000 soak until inflammation decreases, then, Chronic: Desenex as cream at night and powder during day
Ectothrix (T. capitis)	Endothrix (T. capitis)
fungus on surface of hair; Microsporum; Wood's light: Hair fluoresces bright green under UV light	fungus inside hair shaft; Trichophyton ("black dot" ringworm due to the fact that the hair breaks and falls off

Fungus: Epidermophyton floccosum
Type: Cutaneous
Disease: Tinea cruris, Tinea pedis, Tinea unguium
Appearance: As with Trichophyton
Treatment: As with Trichophyton

Fungus: Microsporum canis
Type: Cutaneous
Disease: Tinea corporis, Tinea capitis
Appearance: As with Trichophyton; Wood's light: hairs fluoresce bright green under Wood's light (UV light)
Treatment: As with Trichophyton

Fungus: Candida albicans
Type: Cutaneous
Disease: Candidiasis/thrush
Appearance:

Thrush	creamy plaques; white, cheesy patches; generally painless
Candidiasis/vulvovaginitis	thick, curd-like discharge and vulvar itch; alkaline vaginal pH
Skin	red, weepy, lesions; in/beneath warm moist folds of the body, e.g., arm pits, groin, crural fold
Nails	erythematic edema of nail fold; thickened and horizontally grooved nails that can advance to nail loss

Treatment: Ketaconazole (mucocutaneous candidiasis and vaginitis); amphotericin B (IV) with flucytosine (po) for disseminated disease

Predisposing Factors:

Mouth	corticosteroids, antibiotics, "hyper"glycemia, immunodeficiency
Vulvovaginitis	diabetes, pregnancy, progesterone, antibiotics
Skin	homemakers, cooks, vegetable/fish handlers

BEST TX: avoid moisture: keep areas cool, dry, powdered d/c antibiotic therapy

Fungus: Sporothrix schenckii
Type: Subcutaneous
Disease: Sporotrichosis
Appearance: introduced into skin of extremities during trauma; local lesion develops -- ulcer, abscess or pustule; lymphatics from primary lesion thicken and become cord-like
Treatment: KI po for weeks gives some relief in cutaneous-lymphatic disease; IV amphotericin B for systemic disease

Fungus: Coccidioides immitis
Type: Deep
Disease: Coccidioidomycosis (San Joaquin fever; "desert rheumatism)
Appearance: Infection generally self-limited; inhaled fungal particles cause infection; may be asymptomatic OR influenza-like disease with pyrexia, malaise, cough, aches/pains (of this latter group, about 10% will be complicated by erythema nodosum/multiforme after 1-2 weeks)
Fatality occurs in Filipinos, Blacks, Latin Americans and pregnant women more than any other group -- reasons for racial differences NOT understood; reasons for in pregnancy understood: elevated levels of estrogens and progesterone enhance the growth of C. immitis
Treatment: in most cases: primary infection is self-limited and requires only supportive therapy; best treatment = IV amphotericin B for months in disseminated disease
ASIDE: elastase and a protease have been identified with spherules/endospore lysates: increase infectivity?

Fungus: Histoplasma capsulatum
Type: Deep
Disease: Histoplasmosis, a.k.a. cave disease
Appearance: Inhaled fungal particles engulfed by macrophages in alveoli; cells bud; often heal spontaneously with calcified granulomas -- Disease: lymphadenopathy, hepatosplenomegaly, pyrexia, anemia, nasal, oral and lingual ulcers, death
Treatment: disseminated disease: amphotericin B; mild/moderate disease: Ketoconazole
ASIDE: Comes from chicken, turkey, duck feces and bat guano (disturbances of environment can cause point source outbreaks of infection due to airborne conidia; disease not infectious from person to person; formaldehyde destroys H. capsulatum)

Fungus: Aspergillosis fumigatus
Type: Deep opportunistic
Disease: Aspergillosis, a.k.a., farmer's lung
Appearance: Ubiquitous mold found on vegetation in decay; invades tissues during trauma; three forms:

"Fungus ball"	Invasive granuloma	Allergic Pulmonary Aspergillosis
radiologically visible ball in pre-existing cavity: paranasal sinuses, bronchiectasis, TB	Spreads in lungs to cause necrotizing pneumonia, hemoptysis, dissemination	Asthma, eosinophilia, ↑IgE
NO invasion of tissues; treatment only for primary disorder -- the rest will putatively go away	Primarily in immunosuppressed patients; treat with flucytosine and amphotericin B	Minimal tissue involvement; treatment: supportive therapy

Treatment: As above in box

Fungus: C. albicans
Type: Deep opportunistic
Disease: Candidiasis
Appearance: As with cutaneous disease; ALSO secondary invader of solid organs where a disease process is currently expressing[ed] (TB, CA)
1) Candidal endocarditis occurs primarily in narcotic addicts or on artificial cardiac valves
2) Candiduria may develop after catheterization but subsides spontaneously
Treatment: Ketoconazole in systemic infection; amphotericin B is largely accepted treatment with po flucytosine treatment

Fungus: Cryptococcus neoformans
Type: Deep opportunistic
Disease: Cryptococcosis
Appearance: occurs widely in nature and is particularly high in pigeon feces; disease in humans is generally opportunistic; massively inhaled particles cause disease in normal patients
In immunosuppressed patients, disease disseminates from pulmonary to CNS; meningitis may resemble degenerative CNS disease, brain tumor or abscess or mycobacterial/fungal meningitis; CSF protein is elevated, CSF pressure is elevated, CSF glucose is normal to low
Treatment: ?
ASIDE: pigeon feces grows the organisms well; pigeons, themselves, are NOT infected; behavioral changes in this disease have been mistaken for psychoses

Mycetoma

Associated with trauma to the foot; Clinical appearance: massive induration with draining sinuses; primarily in tropics (due to bare feet); treatment is difficult; white, yellow, black or red granules are extruded in pus; Abscesses form that may extend through muscle and even into bone; rarely is involved in infection of a foreign body (e.g., cardiac pacemaker); no established treatment for fungal mycetoma; prevention is the answer: clean wounds properly and wear shoes!

http://www.mycetoma.org/photogallery/6.htm

Fungus: *Pneumocystis jiroveci* (previously classified as *Pneumocystis carinii*) -- Jiroveci is pronounced "yee row vet zee".
Type: Opportunistic
Disease: PCP
Appearance: rRNA more in line with fungus than with protozoa (previous classification); cysts with 2-8 circular bodies inside (rosette); AIDS most common predisposing condition in U.S.; first documented in Europe after WW II with preemies; P. carinii may require another micro-organisms for its multiplication; alveoli have foamy appearance; fever absent to low grade in AIDS; in older patients and those on high doses of glucocorticoids, abrupt onset with fever (38-40°C); progressive dyspnea/tachypnea, cyanosis and hypoxia supervene; nonproductive cough; require oxygen therapy; SXT po or IV for 14 days; in AIDS, for 21 days
Treatment: SXT (changing to pentamidine for AIDS patients -- this is due to the higher incidence of adverse effects in AIDS patients; while pentamidine is more toxic than SXT, it works with those sensitive to SXT after SXT therapy has begun); trimethoprim plus dapsone*; atovaquone; and primaquine* plus clindamycin*.

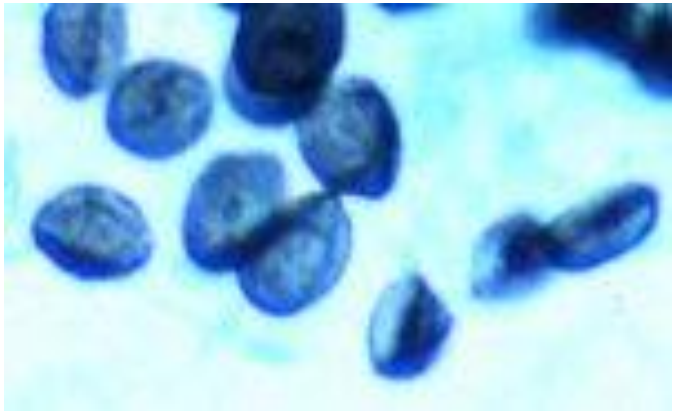


Image Source: http://en.wikipedia.org/wiki/Pneumocystis_carinii_pneumonia -- used per Wikepedia's GFDL and made available in same and under copyright fair use.

Source[s]: http://www.dpd.cdc.gov/dpdx/HTML/Pneumocystis.htm, http://en.wikipedia.org/wiki/Pneumocystis_jiroveci

Fungus: Strachybotrus chartarum
Type: Fungal – deep opportunistic????
Disease: To date, a possible association between acute idiopathic pulmonary hemorrhage among infants and *Stachybotrys chartarum* (*Stachybotrys atra*) has not been proved. Further studies are needed to determine what causes acute idiopathic hemorrhage. *Stachybotrys chartarum* has not yet been proven to cause bodily harm to humans or other animals in "sick buildings."
Appearance: is a greenish-black mold; It can grow on material with a high cellulose and low nitrogen content, such as fiberboard, gypsum board, paper, dust, and lint. Growth occurs when there is moisture from water damage, excessive humidity, water leaks, condensation, water infiltration, or flooding. This fungus found only on cellulose products (such as wood or paper) that have been wet for several days or more. The mold does not grow on concrete, linoleum or tile.
Treatment: Unknown if even necessary – stachybotryotoxicosis is known in horses – not clear what, if any, effects occur in man.

Source[s]: http://www.cdc.gov/nceh/airpollution/mold/stachy.htm
http://botit.botany.wisc.edu/toms_fungi/nov2002.html
http://www.idph.state.il.us/envhealth/factsheets/stachybotrys.htm