The background features a series of thin, parallel diagonal lines in shades of light blue and purple, extending from the top left towards the bottom right. In the lower-left quadrant, there is a circular, swirling pattern of thin, golden-brown lines that resembles a stylized globe or a complex web.

# What's eating you

**By Prof. Desiré Dubounet**  
*Take a closer look at some creatures that may call you home.*

### 1. Dust mite



The dust mite is a microscopic insect -- about 0.5 millimeters (0.012 inches) in length -- that lives in human homes, where it feeds on the dust produced by human and animal skin. Dust mites are not harmful in themselves, but their droppings, which contain leftover digestive enzymes, are a significant cause of asthma and other allergy-related diseases. A person sheds enough skin annually to feed approximately one million dust mites.

### 2. Human flea



Fleas are common bloodsucking parasites. Having no wings, a flea cannot fly, but, having a flat body, it can slip through the strands of its host's hair or fur quite easily on its powerful legs. Only about 3 millimeters (0.125 inches) long, the human flea, *Pulex irritans*, can jump as far as 33 centimeters (13 inches). Fleas can be quite dangerous because they can carry disease from one host to the next.

### 3. Bed bug



The bed bug is a small, wingless, parasitic, bloodsucking insect that feeds on mammals, especially people. The bed bug, often a carrier of infectious diseases, is so named because it often infests beds. Bed bugs can grow to 5 millimeters (0.157 inches) in length and can drink up to six times their weight in blood -- furthermore, they can lie dormant for up to 550 days without food.

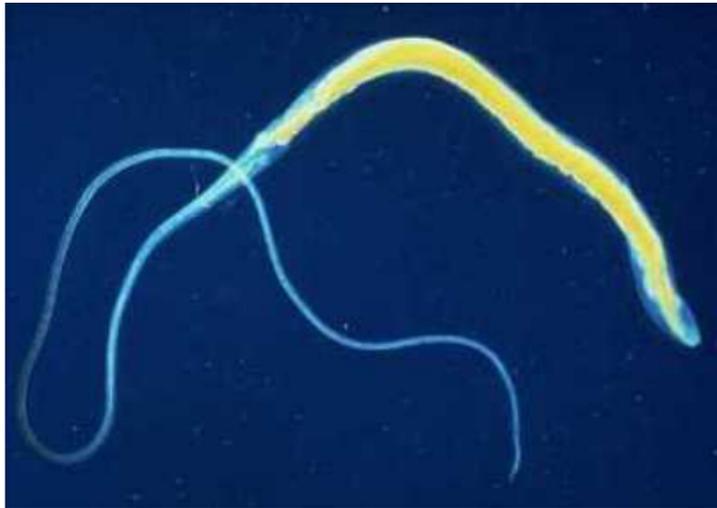
### 4. Louse



The human head louse, *Pediculus humanus*, is one of several kinds of lice with mouth parts specialized for sucking blood. The small, wingless insect has a flattened body 3 millimeters (0.118 inches) long, with a claw on the end of each leg that helps it cling to the hair of its host.

Females lay whitish eggs, called nits, once a day, attaching them to the hair with a sticky substance. They hatch in about a week. Head lice are unpleasant and indiscriminating guests. They infest people who bathe often as well as those who do not, leaving itchy red spots on their hosts' scalps.

## 5. Whipworm



The human whipworm, *Trichuris trichiura*, is a roundworm parasite that infests the large intestine. Females can grow to 50 millimeters (2 inches).

Although roundworm infections are common and frequently go unnoticed, several species, including this one, can cause serious disease. The whipworm's cylindrical, tapering body is simple, consisting of an interior gut and a muscular outer wall.

## 6. Blood fluke



This image reveals the intestinal *Schistosoma mansoni*, one of the species of blood flukes that cause the disease known as schistosomiasis. The males are thick and blue; the females are thin and clear. While in larval form, blood flukes enter the bloodstreams of people or animals exposed to contaminated water in tropical and subtropical climates; they then lay their eggs inside the host's body.

The disease's symptoms, which include diarrhea, inflammation and hemorrhage, vary in humans depending on the species of fluke and what part of the body it infests. The disease may be fatal if untreated.

## 7. Trypanosomes



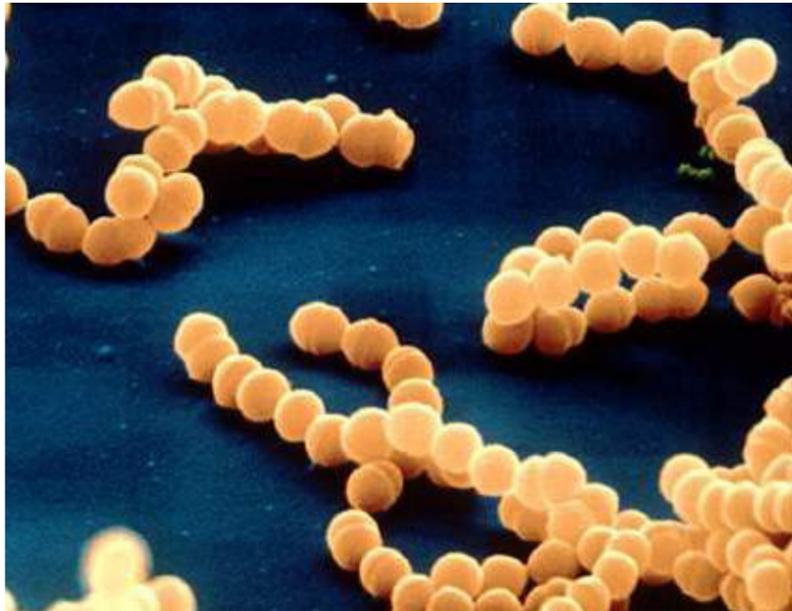
Trypanosomes are parasitic, flagellate protozoa that cause sleeping sickness and Chagas' disease in humans. The characteristically long, wavy trypanosomes can be seen among the doughnut-shaped red blood cells in this blood sample taken from someone with sleeping sickness. The disease is carried by the infected tsetse fly.

## 8. E-coli



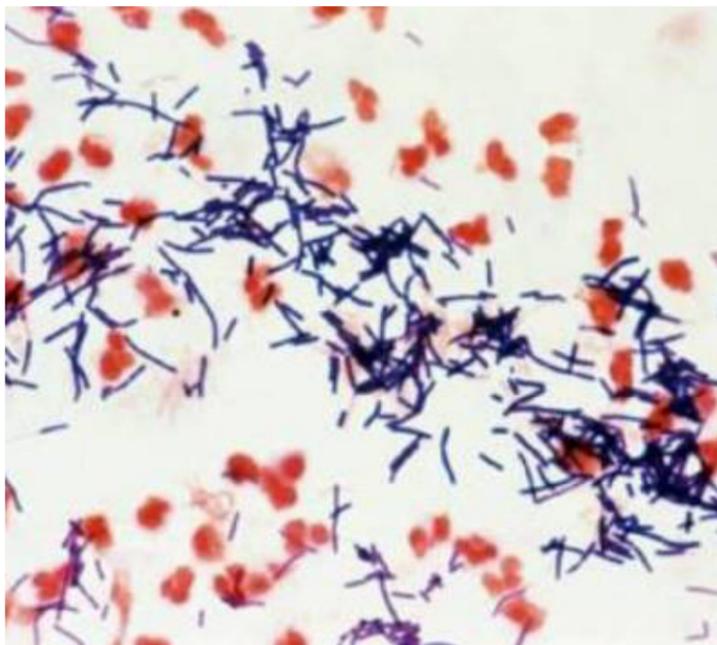
*E. coli* (larger, pink) and *Proteus vulgaris* (smaller, brown) grow side by side in this petri dish culture. Under normal circumstances both types of bacteria harmlessly inhabit the human intestines -- some 5 million *E. coli* bacteria normally inhabit the human and animal intestinal tract and are vital to processing vitamins in the diet. But they can become pathogenic and cause infections, such as urinary tract infections. *E. coli* infection from undercooked meat can be potentially life threatening.

## 9. Streptococcus



A common pathogenic bacterium found in the mouth, throat, respiratory tract, bloodstream, and lesions of humans is *Streptococcus pyogenes*. Often airborne in hospitals, schools and other public places, this bacterium is responsible for a number of human ailments, such as strep throat. Cultures of nonpathogenic lactic streptococci are used in the fermentation of dairy products such as cheese and buttermilk.

## 10. Lactobacillus acidophilus

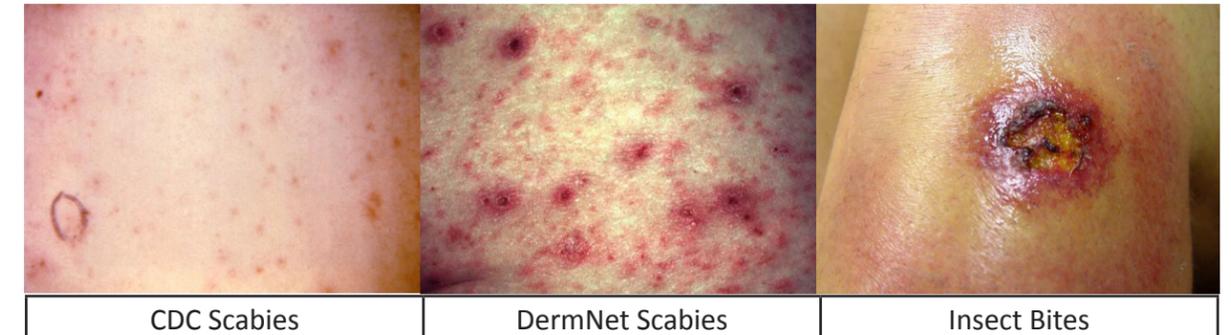


Finally some friendly bacteria! Similar to the type you might consume in your probiotic yogurt drink, *Lactobacillus acidophilus* bacteria is shown here appearing blue. At home in your gut, the breakdown of nutrients by *Lactobacillus acidophilus* produces lactic acid and other byproducts that make the environment hostile for other less-welcome organisms. It also out-competes these organisms for nutrients and aids digestion.

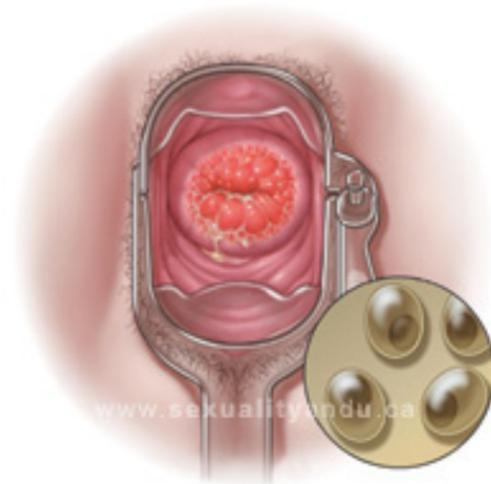
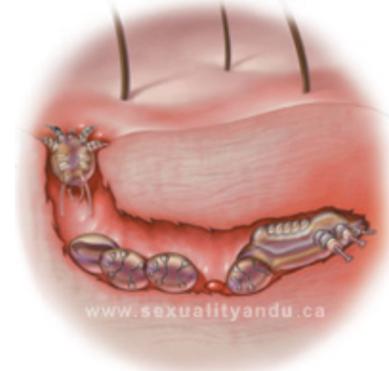
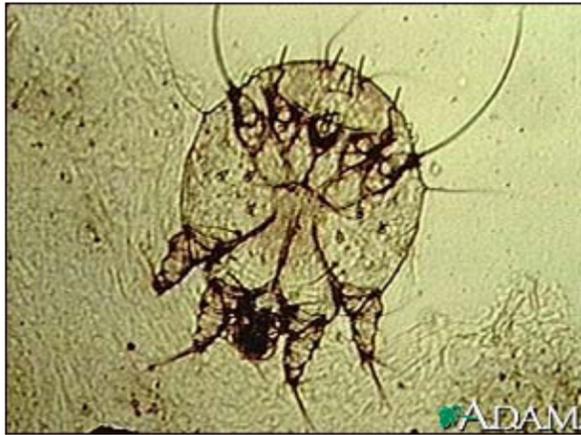
## 11. Scabies

This is a sample picture from DermAtlas, Johns Hopkins University.

### Other DermAtlas pictures: Scabies



- Diagnosis: Scabies / Burrow
- Comments: All the family members including the parents of these children were suffering from scabies for at least 3 months. They were treated with a single overnight application of permethrin 5 % cream and oral antibiotics for one week.
- Category: infections and infestations / papulosquamous eruptions
- Morphology: papulosquamous (bump, scale)
- Organization: grouped, clustered / scattered
- Pattern: symmetric / generalized, disseminated Color: red
- Body Site: hand Age: 5 years
- Gender: Image Year: 2005
- Contributor: Shahbaz A. Janjua, MD First Published: May 17, 2005
- Description: symmetric red papulopustules and crusts.
- Image & content, Copyright DermAtlas, Johns Hopkins University.



## 12. Chlamydia

### What is chlamydia?

Chlamydia is a sexually transmitted bacterial infection caused by *Chlamydia trachomatis* bacteria. It is among the most common STIs in the world.

In Canada, the majority of cases are aged 15-24, and more than twice as many reported cases are from women than from men.<sup>1</sup> Early data for 2004 shows that the rate of chlamydia infection rose by 74.2 percent from 1997-2004. In 2003, that rate of chlamydia infection was about 180 infected people for every 100,000 people.<sup>2</sup>

### How do you get chlamydia?

Chlamydia can be passed along by having unprotected oral, anal or vaginal sex.

### Preventing chlamydia

Using condoms can help prevent the spread of Chlamydia. Condoms and dental dams can also be used for protection during oral sex.

### Symptoms

Chlamydia bacteria can infect the cervix, rectum or the urethra. Sometimes, it can also infect the throat after performing oral sex. Infection can also spread to the eyes by touching an infected area and then touching the eye. In places where treatment is not available, these eye infections can be very serious and can cause blindness.

Most people infected with Chlamydia will not have symptoms. For those who do have them, they usually appear between 2 days to 2 weeks after contracting the infection, but it can take longer. Chlamydia is typically more serious for women than for men, but women are also less likely than men to have symptoms.

### For women, symptoms may include:

- burning while urinating
- vaginal discharge or a change in normal discharge
- bleeding between menstrual cycles, or during/after intercourse
- increase in pain during menstruation or during intercourse
- abdominal or lower back pain
- occasionally causes fever and chills

### Symptoms for men may include:

- itching of the penis
- pain while urinating
- discharge from the penis
- in some cases, there may also be pain or swelling of the testicles
- About half of men will have no symptoms and many will have only mild symptoms.

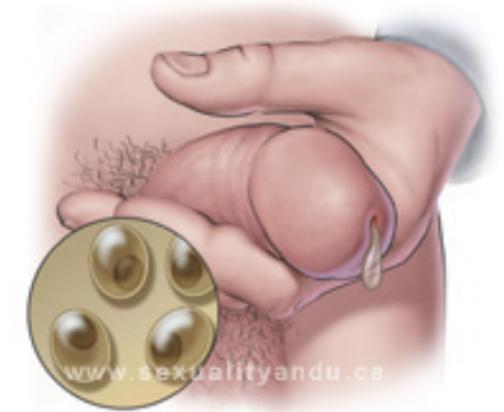
### Symptoms of rectal infection (men and women)

- Discharge
- Redness
- Painful bowel movements
- Itchiness

### Testing

Testing for chlamydia can be performed with a swabbing of the infected area (cervix, urethra, rectum) or with a urine sample.

Remember, chlamydia testing is not included in a woman's regular Pap smear test.



A health care professional may ask for the contact information of recent sexual partners or ask that you inform them that they need testing.

### Treatment

Chlamydia infection can be cured with antibiotics, usually with a single dose.

Follow your health professionals' instructions, and, as with any medication, take as directed and complete the entire duration of the prescription, even if your symptoms disappear.

Did You Know?
<p><b>STI Reinfection:</b></p> <p>In 2006, a study followed 2419 people who had attended an STI clinic. Every three months following their visit to the clinic, the study's participants were retested for chlamydia, gonorrhea and trichomonas. The study found that about one in four of the women and about one in seven of the men tested positive for at least one new STI within the next year.</p> <p><i>Peterman TA et al; RESPECT-2 Study Group (U.S.). High incidence of new sexually transmitted infections in the year following a sexually transmitted infection: a case for rescreening. Ann Intern Med. 2006 Oct 17;145(8):564-72.</i></p>

### Impact if not treated

In women, chlamydia can cause Pelvic Inflammatory Disease (PID), which means that the infection has spread to the reproductive organs. This can cause infertility, chronic pelvic pain and ectopic pregnancy. Symptoms of PID can include foul-smelling discharge from the vagina, high-fever or muscle aches.

Chlamydia can also cause problems getting pregnant or during pregnancy, including miscarriage, preterm birth and low birth weight. Sometimes, the infection can be passed from mother to child during birth, causing a lung or eye infection or even pneumonia.

For men, chlamydia can sometimes cause prostate swelling and inflammation of the urethra and Epididymis. In very rare cases, it can cause infertility in men.

In rare cases it can also cause Reiter's Syndrome, which causes symptoms such as rashes, sores and arthritis-like joint pain. Chlamydia infection can also increase the chance of transmitting HIV.

### What to tell your partner

Like many sexually transmitted infections, many people who are infected with chlamydia will have no symptoms and will be unaware they are infected.

For this reason it is very important to be honest with your partner(s), and also to be honest with your health care provider about your sexual history. Chlamydia is curable with antibiotics, but it can cause long-term damage such as infertility if it is not treated.

Explain to your partner what testing and treatment involves, and you may want to offer to accompany them for support.

### When can I have sex again?

Ask your health care provider. Generally, it will be safe to have sex one week after both you and your partner have completed the entire duration of antibiotic treatments, provided all symptoms have disappeared. You can reacquire chlamydia immediately after your infection has been cured.

Remember, your recent sexual partner(s) have to be tested, and if they are also infected, you will need to wait until they have finished treatment and been completely cured before having sex.

It is always a good idea to use condoms to prevent STIs, but they are particularly important after you or a partner has been treated for an STI.

## 13. Gonorrhea

### What is gonorrhea?

Gonorrhea is a bacterial Sexually Transmitted Infection. It is caused by the bacteria *Neisseria gonorrhoeae*. Gonorrhea is also known as "The Clap".

Though gonorrhea infection was on the decline, the number of people with gonorrhea infection is on the rise in Canada. The bacteria are also becoming resistant to certain types of antibiotics. From 1997 to 2004 the number of reported cases of gonorrhea nearly doubled in Canada, rising from 14.9 to 28.9 per 100,000.1

### How is gonorrhea spread?

Gonorrhea is spread through unprotected oral, anal and vaginal sex with an infected person. It can also be spread from an infected mother to her baby during birth.

### Preventing gonorrhea

Condoms can help prevent the spread of gonorrhea during anal or vaginal sex, and condoms or dental dams can be used for protection during oral sex.

### Symptoms

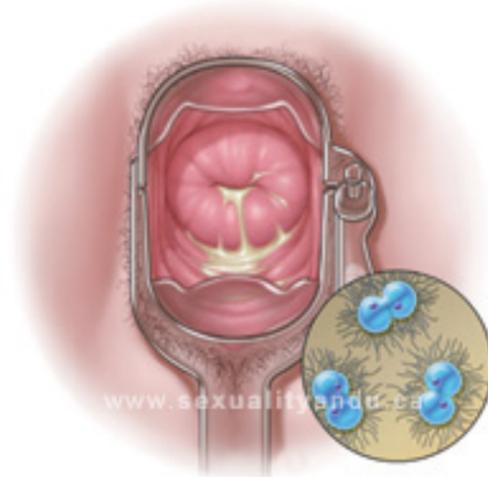
Gonorrhea infection may occur in the rectum, penis, cervix or throat.

Both men and women may have no symptoms, and sometimes a woman's symptoms may be mistaken for a bladder or urinary tract infection.

Remember, infected people who have no visible symptoms can still transmit the infection to others.

For those who do have symptoms, they usually appear within two to seven days of infection, but

this can take up to 30 days. Throat infections may cause a sore throat, though symptoms are rare.



**Many women do not have symptoms. Those that do have symptoms may experience:**

- Burning during urination
- Rectal pain, itching, bleeding discharge
- Vaginal bleeding or pain
- Yellowish-white vaginal discharge



**Some men may have very mild symptoms or no symptoms at all. Those who do may experience:**

- Discharge from the penis
- Burning when urinating
- Painful/swollen testicles
- Symptoms of rectal infection may include:
  - rectal discharge, itching or bleeding
  - painful bowel movements

### Testing

For men and women, testing for gonorrhea requires a swabbing of the infected area or a urine sample. It is important to remember that this test is not part of a regular pap test screening for cervical cancer.

### Treatment methods

Oral antibiotics can usually cure a gonorrhea infection in just one dose, but it can be reacquired immediately after treatment. Some may be resistant to certain antibiotics. Your recent sexual partners should also be informed as they may require testing and/or treatment.

### Did You Know?

#### STI Reinfection:

In 2006, a study followed 2419 people who had attended an STI clinic. Every three months following their visit to the clinic, the study's participants were retested for chlamydia, gonorrhea and trichomonas. The study found that about one in four of the women and about one in seven of the men tested positive for at least one new STI within the next year.

*Peterman TA et al; RESPECT-2 Study Group (U.S.). High incidence of new sexually transmitted infections in the year following a sexually transmitted infection: a case for rescreening. Ann Intern Med. 2006 Oct 17;145(8):564-72.*

### Impact if not treated

Untreated gonorrhea can cause Pelvic Inflammatory Disease (PID) in women, which can cause chronic pelvic pain, infertility and ectopic pregnancy.

Infection can be passed from mother to child during birth, causing serious eye infections or blindness. For men, infection can cause prostatitis as well as epididymitis (inflammation of a small organ which sits at the top of the testes) which can cause infertility. In both sexes, gonorrhea can infect joints, skin, heart and brain and cause permanent damage. Gonorrhea infection increases the risks of transmitting HIV.

### What to tell your partner

Not everyone who is infected with gonorrhea will have visible symptoms, and people without symptoms can still pass along the infection. So even if you had symptoms, it doesn't mean your partner(s) will too. If untreated, gonorrhea can have serious health effects like infertility, but it can also be cured relatively easily. So be honest with your partner(s), explain what's involved in the testing and treatment, and offer to accompany him/her if possible.

You may be required to inform recent sexual partners, as they may need to undergo testing and/or treatment.

### When can I have sex again?

Ask your healthcare professional; it depends on the type of treatment you receive. Usually, with unidose treatment, you should not have sex until 7 days have elapsed after treatment. Take all medications as directed and attend any follow-up appointments that may be required. Remember that people infected with gonorrhea (like many STIs) may not have symptoms, so don't assume that a past sexual partner is not infected because he/she does not have symptoms.

As always, you should use condoms to prevent sexually transmitted infections and gonorrhea reinfection.

## 14. Syphilis

### What is syphilis?

Syphilis is a bacterial STI that is caused by the bacteria *Treponema pallidum*. It is generally a very rare STI, but it can cause serious and permanent damage to the body if it is not cured. In some rare cases, particularly where treatment is not available, syphilis infection can cause death.

Syphilis infection is very uncommon in Canada, but the number of cases is rising very quickly. From 1997 to 2004 the rate rose 908%, from 0.4 cases per 100,000 people to 3.9 cases per 100,000 people.<sup>1</sup> These cases were mostly among men who have sex with men.

### How do you get syphilis?

Syphilis is a sexually transmitted infection that is passed along through anal, vaginal or oral sex. An infected pregnant woman can also pass along the infection to her unborn child.

### Preventing syphilis

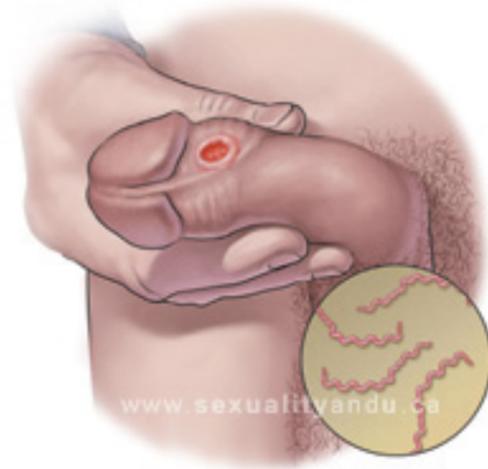
The best way to help prevent syphilis is to practice safer sex practices by using condoms each and every time you have sex. Condoms or dental dams can be used for protection during oral sex.

### Symptoms

Untreated Syphilis infection can progress through four stages: primary, secondary, latent and tertiary. It is most infectious in the first two stages, and does the most harm during the latent and tertiary stage. Syphilis produces a wide range of symptoms that mimic other illnesses. For this reason it has become known as “the great imitator”, and is often very difficult to diagnose.

Syphilis produces different symptoms at each stage of infection. However, some people may not experience symptoms at all during some stages, and others may have some symptoms and not others. These people with few or no symptoms are still infectious, and can still progress to later stages of Syphilis infection.

As a person progresses from stage to stage, the symptoms of syphilis may go away without treatment. This does not mean that the infection is gone. A person may think that the infection has cleared on its own after symptoms disappear, but the infection will persist and long-term



infection can cause serious and permanent damage to the heart, brain, bones or blood vessels.

### Primary Infection Symptoms:

The main symptom of primary syphilis is a single open sore at the point of infection, typically on the genitals, anus or throat. This sore will typically appear Between 10 to 90 days after infection (21 days on average).

This sore will heal spontaneously in 3-8 weeks, but this does not mean that the syphilis infection is gone or that the person is no longer infectious. Because the sore is painless and heals on its own, some people may not seek treatment, and may even forget about the sore entirely after a while. If you develop this sore, it is very important to seek treatment.

### Secondary Infection Symptoms:

Symptoms of secondary Syphilis generally occur three months after contracting the infection. They mimic flue symptoms and may include hair loss (including eyebrows and eyelashes), muscle and joint pain, rashes (particularly on the palms and soles of the feet), and fever and swollen glands. People with secondary syphilis may also generally feel unwell and you may lose weight.

Again, these symptoms will typically disappear on their own, but this does not mean that the person is no longer infected or that they are can no longer transmit the infection to others. Secondary symptoms usually lasts 3 to 12 weeks, but may persist for years until the infection moves into the latent stage. Once in the latent stage, a person may still have “relapses” in which secondary symptoms will reappear.

### Latent Infection Symptoms:

After primary and secondary symptoms disappear, an infected person will enter a latent stage of syphilis, in which they will have no symptoms. However, this does not mean they are no longer infected, and in the early latent infection the person may still transmit the infection to others. During this time, the syphilis bacteria may continue to multiply and infect the body. A person in the latent stage may occasionally return to the symptoms of secondary infection. This latent stage may last for one year to 30 years.

### Tertiary Infection Symptoms:

Tertiary syphilis occurs in 40% of untreated infected persons. This stage is very destructive. It is the stage at which the long-term damage caused by syphilis bacteria results in various major health complications. These complications can include major internal or external sores, serious cardiovascular and mental health problems, and damage to other organs such as the eyes and ears. In some cases, these complications can lead to death.

### Testing

Syphilis testing is performed through a blood test, or by a swabbing from an infected sore.

### Treatment

Syphilis can be cured with antibiotics. Remember, a person can reacquire syphilis infection, so their partner(s) should also be tested.

### Impact if not treated

Untreated Syphilis can cause potentially life-threatening complications, and permanent damage to the brain, heart, bones, and blood vessels. Sometimes, syphilis can cause mental disorders or neurological problems. In very rare cases, untreated syphilis infection can be fatal. Syphilis is curable with antibiotics but over time it can cause permanent damage to your health, so it's important to get tested for STIs if you are at high risk or if you are experiencing symptoms.

Pregnant women can pass syphilis on to their unborn children, and children infected with syphilis at birth or before have what is called congenital syphilis. Congenital syphilis is very serious, and can cause serious medical complications or death.

Because Syphilis can cause lesions and sores on the genitals or anus, it increases the risk of HIV transmission.

### Is it contagious?

Syphilis is most infectious during the primary and secondary stages, and can also be infectious during the early latent stage, particularly during relapses to secondary stage symptoms.

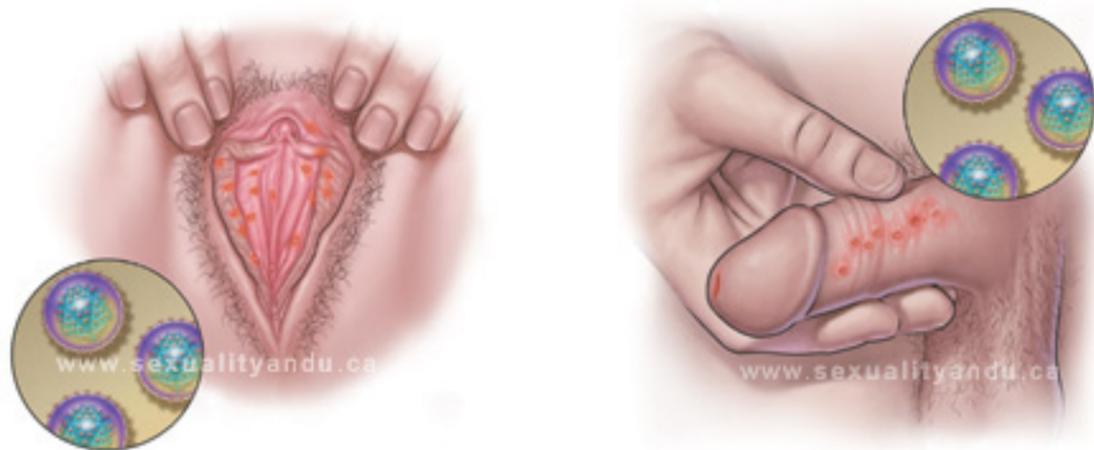
### What to tell your partner

Syphilis is easily treatable, but the longer it goes untreated, the more harm it can cause. Your partner will need to be tested and/or treated immediately. It is very important to be honest with your sexual partners. The earlier your partner(s) know they may be infected the more likely they will be to avoid long-term health complications.

### When can I have sex again?

You should not have sex again until you have been treated, your symptoms have disappeared, your tests for syphilis are negative and your health care provider informs you that you are no longer infectious. Your partner(s) should also be tested.

## 15. Genital Herpes



### What is genital herpes?

Genital Herpes is caused by the Herpes Simplex Virus (HSV) which is from the same family of viruses that cause cold sores. Cold sores are generally caused by a type of Herpes Simplex Virus called HSV-1, and genital herpes is usually caused by type HSV-2. However, both types can infect the genital areas, causing painful sores.

There is no cure for genital herpes and often people will have recurring outbreaks. During these outbreaks the infected person will have sores and symptoms for a while, then the virus will go into a dormant stage and the person will have no symptoms again until the next outbreak. The number of outbreaks and the amount of time between outbreaks varies from person to person. Some people may have them frequently and others may have only one or two. It is still possible to transmit the virus during the dormant stages when a person has no symptoms.

### How do you get genital herpes?

Genital Herpes is spread through skin-to-skin contact with an infected area, typically during oral, anal or vaginal sex. In rare cases, a herpes infection can be spread from mother to child during birth. Active cold sore infections of HSV-1 can also be transmitted through kissing. When transmitted through oral sex, a herpes infection can be passed both ways - from mouth to genitals, or from genitals to mouth. The herpes virus is not spread through shared toilet seats, swimming pools, hot tubs or bathtubs.

### Preventing genital herpes

- Condoms can help prevent HSV. However, because HSV can be passed from skin-to-skin contact, condoms likely offer less protection against HSV than against most other sexually transmitted infections.
- Use condoms and dental dams for protection during oral sex.
- Avoid sex when a person is visibly infected.
- Avoid oral sex with a person who has had a cold sore recently.
- Remember, an infected person can pass the virus even when they have no visible infection, so using protection such as condoms is always important.

### Symptoms

Many people with HSV may have no symptoms or only mild symptoms. For those with symptoms, an active genital herpes infection may be visible and very embarrassing.

### Symptoms for both men and women include:

- Itchiness of genitals
- Small blisters in the vagina or on the vulva or cervix; on or around the penis or testicles; on or around the anus; or on the thighs or buttocks
- Tender lumps on the groin (especially at the time of the first episode)
- The first episode may be accompanied by fever or headaches.
- Blisters often burst leaving painful sores. These sores may dry up leaving scabbing which may fall off
- Painful urination
- A slight tingling or burning may be a sign that an active outbreak is coming

Symptoms typically appear within 2 to 20 days of infection. For those with symptoms, outbreaks may occur frequently during the first few years after infection. As time goes by, these outbreaks are likely to become less common.

Infection from oral sex can cause sores inside the mouth or on the lips of both men and women. Though infection is commonly on or around the mouth or genitals, HSV can sometimes cause outbreaks of sores on the skin elsewhere on the body.

### Testing

Testing for Herpes is performed by taking a tissue scraping sample or by taking a culture of an active sore or blister. A blood test can also detect HSV-1 or HSV-2 infections.

### Treatment

There is no cure for Herpes, but effective treatments for outbreaks do exist. To be effective these treatments must be started immediately after symptoms appear. Outbreaks of sores may appear again and again throughout a person's life. Medication can be taken to make these outbreaks less common, and to treat the sores themselves.

### Managing the symptoms of genital herpes infection:

- Wear loose clothing during outbreaks
- Drinking large amounts of fluids will decrease pain during urination, and urinating in the bath may be less painful
- Wash your hands with soap and water if you touch an infected area, and in particular, do not rub your eyes or touch your mouth after touching infected skin
- Avoid further infection by keeping the infected area clean and dry. When drying actively infected areas, use a hair dryer or lightly pat the area dry
- Epsom salts in bath water can help clean and dry out infected areas
- Wash bath towels before reusing and wash underclothing frequently
- A healthy lifestyle including proper diet, adequate rest and low stress levels can improve your immune system, and reduce the likelihood of outbreaks
- If you think you have herpes, see a doctor immediately. Medication is available to help treat infected areas and to reduce the pain of sores. This medication may be prescribed for outbreaks as they happen, or it may be taken regularly to suppress the virus and lower the chance of having an outbreak.

### Long-term impact

There is no cure for Herpes, but frequency and severity of infections can be partially managed with medication. By themselves, HSV-1 and HSV-2 are generally not considered a serious health risk. However, in very rare cases, the Herpes Simplex Virus can cause serious illness. Infected pregnant women can pass the virus to infants during birth, causing lesions and possibly life-threatening infections of the central nervous system of the baby. In a very small number of cases HSV can cause meningitis or encephalitis (inflammation of the brain), and herpes infection of the eye can cause scarring of the cornea and even blindness. Because Herpes can cause sores on the penis or inside the vagina, it also increases the risk of transmission of HIV, the virus that causes AIDS.

### What to tell your partner

For a few reasons, Herpes may be more difficult to talk about than other STIs: it is incurable, it can be transmitted through oral sex, and condoms do not completely protect against transmission.

For an existing partner, there is a chance they may already have the virus but they may experience no symptoms or only mild symptoms.

If you are diagnosed with the herpes simplex virus, it is important that your partner be tested even if he or she does not have symptoms.

### When can I have sex again?

Having Genital Herpes does not mean your sex life is over, but it is an incurable, contagious infection. It can be transmitted through oral sex, and can be transmitted when you have no symptoms. Condoms will help reduce this risk but may not cover all infected areas. So, when deciding to have sex, you and your partner will have to accept a certain amount of risk. It is your responsibility to inform your partner of this risk.

If you have herpes, safer sex should always be practiced. Avoid having sex when you have an active infection. Ask your health care provider for more information about having sex while infected with HSV. Some suppression medications for Herpes may also lower the risk of transmitting the virus.

Oral sex can transmit the virus both ways (from mouth to genitals or from genitals to mouth) so protection is very important for both partners. Male partners should always wear condoms when receiving oral sex. For women, a dental dam or a condom cut lengthwise should be placed over her genitals to form a barrier between mouth and skin.

## 16. Human Papilloma virus (HPV)

### What is HPV?

*HPV infects the body inside and outside:*

The human papillomavirus or HPV is one of the most common family of viruses in the world today. HPV is also the world's most common sexually transmitted infection and is transmitted by skin-to-skin (including sexual) contact. HPV infects cells inside and outside of the body. These include surfaces of the skin, lining of the mouth, tongue, throat, tonsils, vagina, penis, cervix, and anus.

Most people who get HPV don't have any signs or symptoms and may unknowingly spread the disease. HPV is not related to HIV (the human immunodeficiency virus, which can cause AIDS). However, people with HIV have weakened immune systems and are therefore likely to be infected with various germs, including one or more types of HPV.

### Different health risks caused by different types

There are many different types of HPV viruses. Over 80 types of HPV have been reliably identified, but researchers believe there are likely over 200. Some types of HPV can cause common skin warts and plantar warts (warts on the soles of the feet), while over 30 other types of HPV affect the anogenital tract (on or between the anus and genitals).

*Of those HPV types that can cause genital infections:*

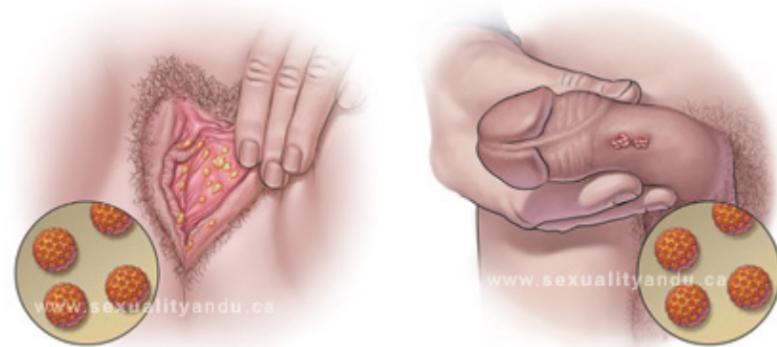
- Some types (such as 16 and 18) can cause pre-cancerous lesions, cervical cancer and other genital cancers and are referred to as carcinogenic or 'high-risk HPV types'.
- Other types (such as 6 and 11) can lead to genital warts and are referred to as 'low-risk HPV types' because they rarely cause cancer.

### **Skin warts**

The most visible types of HPV are skin warts (common, plantar or flat) that develop on areas of the skin such as the hands, arms, legs and bottom of the feet. HPV infections of this type are very common, harmless, non-cancerous, and easily treated.

### **Genital warts**

Not to be confused with skin warts, genital warts (also known as condylomata acuminatum) are mostly caused by HPV types 6 and 11. In women, genital warts can appear on the vulva, urethra, cervix, anus or thighs. In men, they can appear on the penis, scrotum, anus or thighs.



### **Pre-cancerous lesions**

In women, HPV can infect cells on the vagina and cervix where they can't be seen. These lesions (medically known as dysplasia, or abnormal cells of the cervix) are considered to be a pre-cancerous condition. HPV is one of the most frequent causes of cervical dysplasia. There are three types of cervical dysplasia: mild, moderate and severe. Left untreated, dysplasia can progress to cervical cancer.

### **Cancers**

Carcinogenic types of HPV cause most cervical cancers and 70% are caused by HPV types 16 and 18. These types may also be linked to oral and penile cancers. Research has shown a strong link between anal cancer and HPV 16.

### **Transmission and natural history of HPV**

HPV is not transmitted by blood. The most common means of transmission is by skin-to-skin contact with the penis, scrotum, vagina, vulva, or anus of an infected person. Kissing or touching a partner's genitals with the mouth can also transmit HPV. Using a condom does not guarantee

protection since the virus can be on an area of skin not covered by the condom.

HPV is usually acquired at a young age at the time of sexual debut, typically measured as the age of 'first intercourse'. Research shows that sexual debut for young Canadians (male and female) can be as young as 15 years of age and it has been reported that oral sex is practised by girls as young as 12 and 13 years old, regardless of their social or economic background.

*Genital warts are very contagious and are spread during oral, vaginal or anal sex with an infected partner:*

- Most people (66%) who have sexual contact with a partner infected by genital warts will develop warts themselves, usually within three months of contact.
- Genital warts can cause problems during pregnancy:
- Sometimes they get larger, making it difficult to urinate.
- They can make the vagina less elastic and cause obstruction during delivery.
- In rare cases infants born to women with genital warts develop warts in their throats - a potentially life-threatening condition for the child.
- Genital warts may last for years and eventually go away. Even if this happens the HPV virus can remain dormant in the body and the manifestation can return at a later date.
- *The natural course taken by an HPV infection varies over time and from one person to another:*
- Genital warts can develop quickly inside or outside the vagina, usually within three months of contact with an infected person.
- Within one year of initial HPV infection, low-grade cervical dysplasia (CIN 1) may develop (CIN stands for cervical intraepithelial neoplasia and is a system of classifying cervical lesions: CIN 1 = mild, CIN 2 = moderate, CIN 3 = severe).
- In some women the HPV infection persists and can lead to the beginning stages of cancer (CIN 2-3) - this transformation is generally slow and can take anywhere from five years to a lifetime.

### **Symptoms - physical and psychological**

#### **17. Genital warts**

*Though usually painless, symptoms for genital warts include:*

- Itching or burning sensation and occasional minor bleeding as a result of anal sex or bowel movement.
- The cauliflower-like growths are unsightly and embarrassing and associated with a high incidence of depression, sexual dysfunction and disruptions to long-term relationships.
- Research conducted among people with visible genital warts and who were diagnosed with HPV reported feelings of:
- Depression, shame, guilt;
- Fear of rejection by their partner, loss of sexuality and enjoyment of sex.

### **Pre-cancerous lesions**

Cervical dysplasia seldom causes any noticeable symptoms. It is usually detected through a Pap test (smear) or colposcopy. HPV infection has social and psychological consequences. Studies of women who have received abnormal Pap test results indicate that they often experience

psychological consequences including:

- Anxiety, fears about cancer;
- Sexual difficulties;
- Changes in body image;
- Concerns about loss of reproductive functions.

### Treatments and strategies for prevention

#### Vaccination against HPV

Vaccination to prevent the most common types of HPV infection and cancer of the cervix is now available in Canada. The Government of Canada has approved vaccination for females between the ages of 9 and 26, and studies show that the vaccination is 100% effective in stopping four types of HPV infection. These four types of HPV can cause:

- pre-cancerous changes and cancers of the cervix, vulva and vagina (types 16 and 18), as well as
- genital and anal warts (types 6 and 11).

These four types of HPV cause 70% of all cancers of the cervix and 90% of genital warts, and associated diseases such as cancers of the vagina and vulva. The HPV vaccination does not stop you from getting other sexually transmitted infections. Even when you have been vaccinated, you should always use a condom during sex to protect yourself.

Regarding treatment, unlike bacteria, viruses cannot be destroyed with antibiotics, and there is currently no medical cure to eliminate an HPV infection. Treatment depends on the type of HPV infection and in the case of cervical cancer the stage of development.

#### Genital warts

Trying to remove the visible warts does not always eliminate HPV and genital warts can reappear. Chemical treatment methods can be painful, embarrassing and may cause scarring. Two powerful chemicals (podophyllin and trichloroacetic acid) are capable of destroying external genital warts with direct application, but this must be repeated several times. A new product, Imiquimod cream, is now available and has had some success at stimulating the immune system to fight the virus.

*Depending on the size, number of warts and where they are located, other methods for removal of external warts include:*

- Cryotherapy (damaged cells are killed by freezing them with liquid nitrogen);
- Electrosurgery (passing an electric current through abnormal cells);
- Laser therapy (super heats and vaporizes abnormal cells).

### 18. Cervical cancer

Early-stage cervical cancer can usually be treated successfully. Options at this stage can include LEEP (loop electrosurgical excision procedure - the removal of tissue using a hot wire loop), laser therapy or cryotherapy. If the cancer has invaded deeper layers of the cervix and has spread to the uterus, more extensive treatment may be involved such as a radical hysterectomy with lymph

node removal. Side-effects associated with this procedure include: inability to control urination, sexual problems, psychological stress, and swelling in the legs.

Later-stage disease kills by invading nearby tissues. There are some benefits from chemotherapy and radiation therapy. Disease that has spread beyond the pelvis is generally regarded as incurable since the survival rates are about one in five. Cervical cancer can be prevented through detection and treatment, but the ideal solution is to prevent the infection that causes it - HPV.

At present, it is almost impossible to break the chain of communicability by stopping unprotected sexual activity. Even when condoms are used, they cover only the penis (or the outer edge of the vagina in the case of the female condom) and other anogenital skin contact can occur. Also, some people are allergic to latex; they use condoms made of sheep intestine instead, but these condoms have pores large enough to let small bacteria and viruses such as HPV through.

Vaccination would be another prevention strategy that would dramatically change the HPV landscape. Researchers are currently working on vaccines to prevent HPV infections that can cause cervical cancer and genital warts.

### 19. Trichomoniasis (Trich)



#### What is trichomoniasis?

Trichomoniasis, or trich (pronounced “trick”), is a common STI that usually has very few symptoms. It is caused by an infection of microscopic parasites called *Trichomonas vaginalis*. For women, these parasites may infect the vagina, urethra, bladder or cervix. In men, the infection is usually in the urethra, or under the foreskin of uncircumcised men.

#### How do you get trichomoniasis?

Trichomoniasis is spread through sexual contact with an infected person.

#### Prevention

The best way to help prevent Trichomoniasis is to use a condom each and every time you have sex.

#### Symptoms

Many people, particularly men, will not have symptoms of a trich infection. If symptoms do appear, they usually appear within one week of infection, though they can take up to six months. For some people, symptoms may go away and then return later.

In men, trichomoniasis is rare and most men will not have symptoms.

**For men symptoms may include:**

- mild discharge
- irritation or redness at the top of the penis
- burning during urination
- Men may often become unknowing carriers of trich infections. Treatment is required to ensure that a trich infection is completely gone

About half of women will have symptoms of a trich infection.

**For women, symptoms may include:**

- Discharge from the vagina
- Vaginal odour
- Pain during intercourse or urination
- Irritation or itchiness of the vagina

**Testing**

Testing may be done by physical examination or lab testing to detect the parasite.

In some cases, the tiny sores caused by trichomoniasis may be detected during a routine pap test for women; however, pap smears do not specifically test for sexually transmitted infections, and you should never rely on a pap smear to detect trichomoniasis or any other sexually transmitted infections.

**Treatment**

Typically, trichomoniasis can be treated with a single oral dose of an antibiotic called Metronidazole. However, Trichomonas can be reacquired easily so it is important that you and your partner(s) be treated together. Trichomoniasis may not show symptoms, so even if your partner doesn't have symptoms, he or she should still be tested.

Did You Know?
<p><b>STI Reinfection:</b></p> <p>In 2006, a study followed 2419 people who had attended an STI clinic. Every three months following their visit to the clinic, the study's participants were retested for chlamydia, gonorrhea and trichomonas. The study found that about one in four of the women and about one in seven of the men tested positive for at least one new STI within the next year.</p> <p><i>Peterman TA et al; RESPECT-2 Study Group (U.S.). High incidence of new sexually transmitted infections in the year following a sexually transmitted infection: a case for rescreening. Ann Intern Med. 2006 Oct 17;145(8):564-72.</i></p>

**Impact if not treated**

In rare cases, trichomoniasis can cause pelvic inflammatory disease (PID) in women, which can cause infertility, chronic pelvic pain or ectopic pregnancy.

If a pregnant woman is infected with Trichomonas, it may cause premature delivery or low birth weight. Trich can cause small sores and inflammation, which can increase the risk of HIV transmission. Detection and treatment of a Trichomonas infection will help lower your risk of contracting HIV.

**What to tell your partner**

Trichomoniasis is easily treated, but your partner(s) may not have symptoms. Also, if you're with a partner who's infected, they can reinfect you after you've had treatment.

Telling a partner about a trichomoniasis infection may be embarrassing, but it's important to be very honest with your partner(s). Let them know so that they can get tested and treated if necessary.

**When can I have sex again?**

Ask your health care professional when receiving treatment about when you can have sex again. Do not have sex again if you or your partner(s) have not fully completed treatment, or if you are still displaying symptoms of infection. Remember, you can become reinfected immediately after your infection clears up. As always, it's a very good idea to use condoms to help prevent sexually transmitted infections and trichomoniasis reinfection.

**20. Crabs (A.K.A. Pubic Lice)**



**What are Crabs / Public Lice?**

Measuring in at about a millimetre tall, pubic lice (phthirus pubis) are tiny crab-like insects that nest in pubic hair. They bury their heads into the skin and live off human blood, laying their egg sacks (nits) near the base of the pubic hairs.

A substance they secrete into the skin can cause intense itching, and the bites of adult lice turn small patches of skin to a bluish-grey colour.

Unlike head lice, pubic lice have small, wide bodies and arms that resemble crabs. These lice can also be found in chest, armpit and facial hair, eyebrows and eyelashes.

**How are Crabs / Public Lice spread?**

Pubic lice can be spread during intimate contact. They do this by crawling from one person to another, since they have no wings. Pubic lice also can live for one to two days in bedding, towels

and clothing belonging to an infected individual, and these items can be a source of transmission. Lice are not related to poor hygiene. Anyone can get lice, though it's most common among sexually active people and in situations where individuals are in close contact.

### Prevention

- Avoid sharing towels and clothing that have not been washed.
- If it can't be washed, vacuum it.
- When trying on underwear or a bathing suit at the store always wear something underneath.

### Symptoms

- Pubic lice and nits are small and can be difficult to spot. Infected individuals may experience:
- Skin irritation and inflammation accompanied by itchiness and redness.
- Small blue spots on the skin where lice have bitten.
- Louse feces, fine black particles, in the infected person's undergarments.

### Testing

Healthcare professionals inspect the area for the crabs and the small greyish-white eggs they lay. Adult lice can easily be identified just by looking at the area with a magnifying glass, or viewing a sample of the area under a microscope.

### Treatment

- Non-prescription shampoo that can be purchased at a pharmacy, clinic or doctor's office. Usually one wash is all it takes. In cases where a second washing is needed, apply it four days after the first treatment. The pharmacist will be able to help you
- A fine-toothed comb or the fingernails can be used to scrape the eggs off the hairs.
- It's important to tell recent sex partners so they can be treated at the same time.
- Clothes, bedding, and other possible contaminated items should be washed in hot water or dry cleaned, or bagged for a week. Items that cannot be washed or bagged should be vacuumed.
- Shaving may not necessarily get rid of the problem

### Impact of not treated

- It won't go away on its own.
- Persistent scratching of irritated skin can cause a secondary bacterial infection.

### What to tell your partner

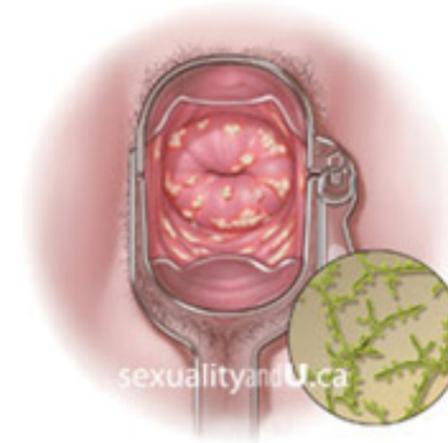
Pubic lice are easily treated, but your partner(s) may not know they have them. Telling a partner about pubic lice may be embarrassing, but it's important to be very honest with your partner(s). All sexual partners who have had contact with an infected person in the month before diagnosis should be tested and treated to help prevent reinfestation. If you're with a partner who's infected, they can reinfect you after you've had treatment, so it's best to get treated at the same time.

### When can I have sex again?

Ask your healthcare professional when receiving treatment about when you can have sex again. Do not have sex again if you or your partner(s) have not fully completed treatment, or if you are

still displaying symptoms of infection. Remember, you can become reinfected immediately after your infection clears up.

## 21. Yeast Infections



### What is a vaginal yeast infection?

A vaginal yeast infection is a common fungal infection caused by overgrowth of *Candida*, naturally occurring yeast. Yeast are normally found in a woman's vagina in small numbers, but sometimes they can multiply and change the normal balance of bacterial growth. When the fungi begin to grow in excess, they may develop into candidiasis.

These are the most likely fungi to cause yeast infections as well as infections in other moist areas of the body, such as the mouth (thrush), skin folds, and beneath the fingernails.

### What are the risk factors for getting a yeast infection?

- Pregnancy
- Birth control pills
- Menstruation
- Recent or current use of antibiotics and certain other prescription medications
- Unprotected sexual activity
- Mismanaged diabetes
- A weakened immune system
- Often we don't find the cause

### What are the symptoms of yeast infections?

#### **Women may experience:**

- Vaginal itching
- Burning while urinating
- Pain during intercourse
- Swollen or red vulva
- Thick, white discharge resembling cottage cheese

#### **Men with an infection may develop balanitis, an inflammation of the head of the penis, and may experience:**

- Painful swelling on the tip of the penis
- Itching
- Red dots on the tip of the penis
- Dry peeling skin
- Burning during urination

### Is a yeast infection a sexually transmitted infection (STI)?

A yeast infection (or candidiasis) is not considered a sexually transmitted infection. In fact, they are a very common and normal part of women's lives. An estimated three in four women will have a yeast infection in their lifetime, and many of these women will have recurring infections. In rare cases, a yeast infection can be spread through vaginal intercourse among partners who have unprotected sex, but the risk is low. Like any other vaginal infection, they should be treated immediately, and if you are sexually active and your partner is having symptoms, he or she should also seek treatment. In any case, sex should only resume once symptoms disappear.

Women commonly misdiagnose themselves with yeast infections when they need to be treated for other conditions. Recurring yeast infections can sometimes be a sign of an STI or some other condition that requires treatment, such as a bacterial infection. If you or your partner frequently experience some of the symptoms, it's advisable to get tested to rule out STIs.

### What if I experience any of the symptoms?

If you think you may have a yeast infection, but have never had one before, it is a good idea to see a health-care professional the first time to be diagnosed correctly before trying an over-the-counter treatment. It's important to establish that they are truly yeast infections. Some women have a different vaginal discharge just before their period, and if it is itchy or irritating, it may be perceived as a yeast infection. There are many other things that can cause the same symptoms, and yeast creams may not fix the symptoms or can make them worse.

If the yeast species is resistant to the treatment used, the infections can recur, or never go away. In this case, your doctor can look for yeast under the microscope to confirm the diagnosis and can culture the yeast with a vaginal swab if the organism is resistant to treatment. Women who have confirmed recurrences of yeast infection in the week before menstruation can often get relief by taking a single tablet of a prescription medication each month about the time the infections have been recurring. Recurrent candidiasis (yeast infections) affects 5-8% of pre-menopausal women.

If you have a yeast infection, you and your partner should both abstain from sexual activity until the infection has been treated, or else you risk further irritating the vagina or reinfesting each other.

### How are yeast infections treated?

Most yeast infections can be treated with over-the-counter antifungal (local) medications, but it's recommended you consult a health care professional before trying anything, especially if you are pregnant. Talk to a health-care practitioner about all the prescription and non-prescription drugs you are taking before you start any treatment. Burning of the genital area and rash after application is a common side effect of the treatment.

Once the yeast infection is confirmed, it is usually easily treated by over-the-counter treatments or prescription medications. Over-the-counter treatments are easily available and usually less expensive, such as tablets or suppositories that are inserted into the vagina, or ointments and creams (clotrimazole) that can be applied directly to the infected area for one to seven days. Prescriptions are typically taken in pill form and usually cure the infection faster, although they have more side effects like nausea and vomiting and are more expensive.

*Some women do get cyclic yeast infections based on hormonal changes in the vagina. In this case, your options would include:*

- Continue to treat the yeast infection each month
- Get the yeast infection pill (fluconazole) from your doctor and take it each month in the week before your period to prevent a yeast infection
- A yeast-free diet is also a treatment method for recurring yeast infections.

### How do I prevent another infection?

A well-balanced diet with plenty of fibre can be the best preventative medicine. Wear loose dry clothing and avoid wearing wet clothing for extended periods of time.

*Women can also take hygienic precautions to decrease the likelihood of developing an infection:*

- Keep your genitals clean and dry, and rinse well after using soap.
- Avoid vaginal douching after sex.
- Never put anything in your vagina after it has been in your anus. After using the washroom, wipe from front to back.
- Avoid vaginal deodorants and perfume products such as soaps that can irritate the vagina.
- Wear underwear made of cotton instead of synthetic fabrics.

## 22. Morgellons

After years of debate and controversy, the CDC is finally looking into the mysteries of Morgellons, an unexplained and debilitating skin condition that many doctors don't believe exists.

Images courtesy Morgellons.org

**Strange Symptoms: The lip of a three-year-old (left) whose parents believe he may have Morgellons, and facial skin removed from a child (right, magnified photo)**

By Jenny Hontz



**Deanna Odom** was either delusional or she was suffering from a bizarre and devastating illness that doctors cannot treat. In December 2004 the 36-year-old mother of two teenagers started developing lesions on her arms, legs and backside. At times, she says, it felt as if needles were stinging her. And then she noticed strange, colored fibers emerging from her skin. "They would

almost look like dust fibers," says Odom, who lives in Torrance, Calif. "I would put my hands together and my hands would puff off the fibers. Combing my head, you could see the fibers emerging. It's literally almost out of a sci-fi movie. You think, 'This isn't happening.'"

After seeing a TV news report in February 2005, Odom became convinced she was suffering from Morgellons, an unexplained condition that has sparked debate and controversy within the medical community. Some doctors and researchers believe Morgellons is an emergent disease characterized by nonhealing skin lesions, crawling or itching sensations, fibers and black granules emerging from the skin, and neurological impairments such as short-term memory loss. The problem, for Odom and thousands of others who believe they suffer from the disease, is that most dermatologists think there is no such thing as Morgellons. They attribute the suffering of patients like Odom to delusions or anxiety-driven self-mutilation.

Now the Centers for Disease Control and Prevention (CDC) have launched their first study of Morgellons, which may provide some answers as early as next year. Michele Pearson, the CDC's principal investigator, says the agency got involved after receiving an increasing number of calls—averaging about 100 a month since November 2006—from patients, doctors, public health officials and members of Congress asking the CDC to look into Morgellons, which the agency describes as "an unexplained skin condition."

Patients in the study will undergo medical, dermatological and psychological examinations, including blood tests and skin biopsies. The study will be conducted in conjunction with Kaiser Permanente's Northern California Division of Research. Any fibers collected will be analyzed by the Armed Forces Institute of Pathology, which has both forensics capabilities and an environmental research lab. "We are absolutely going into this with an open mind," Pearson says.

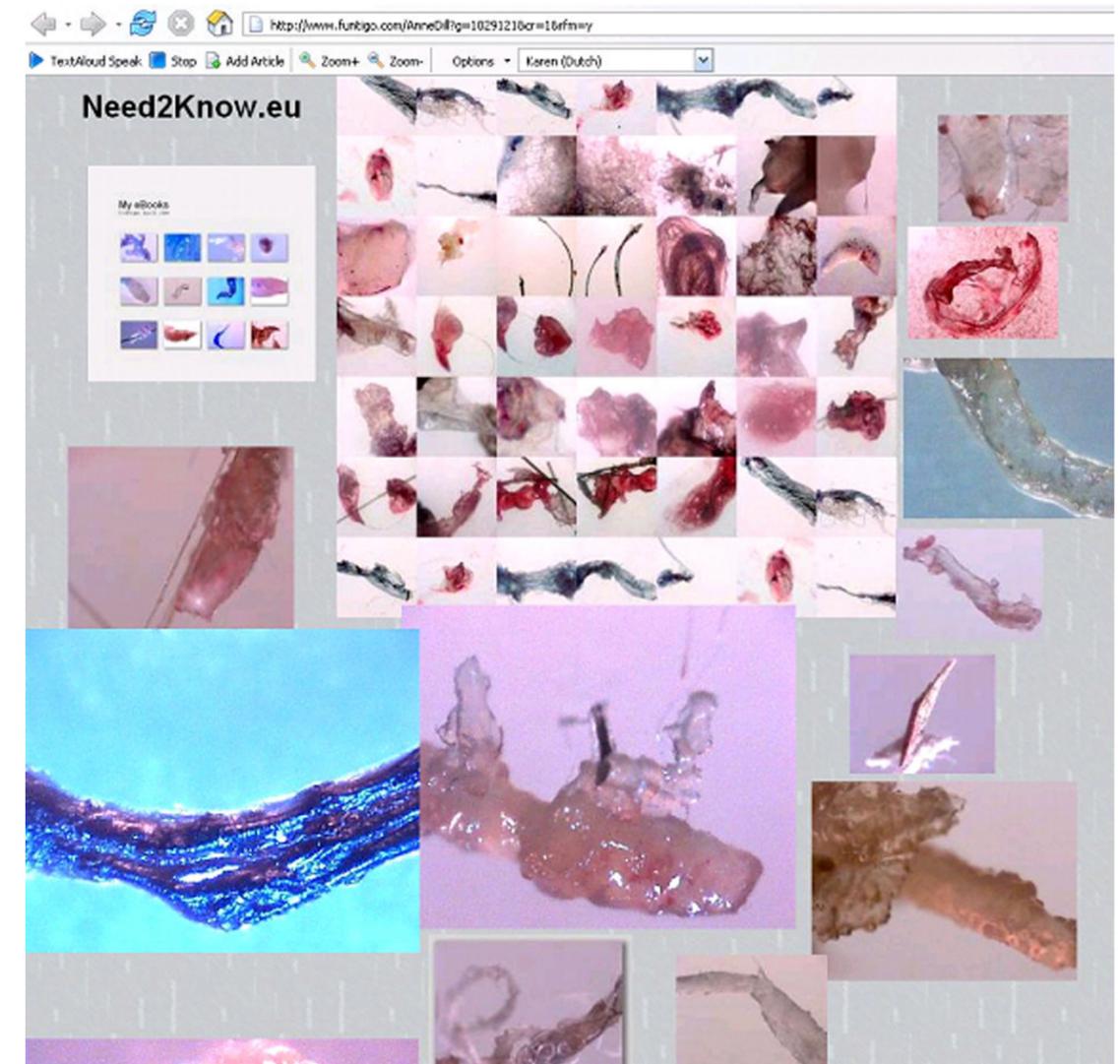
But many doctors have already formed their own opinions about Morgellons. Jeffrey Meffert, a dermatologist and associate clinical professor at the University of Texas Health Science Center in San Antonio, is a vocal Morgellons skeptic, often debunking the disease in presentations to colleagues. He says he sees at least one patient a month claiming to have Morgellons, but he diagnoses most of them with prurigo nodularis, a condition sometimes fueled by anxiety and characterized by chronic itching and scratching, which creates hardened nodules on the skin. More rarely, he says, patients have the mistaken belief that they are infested with parasites.

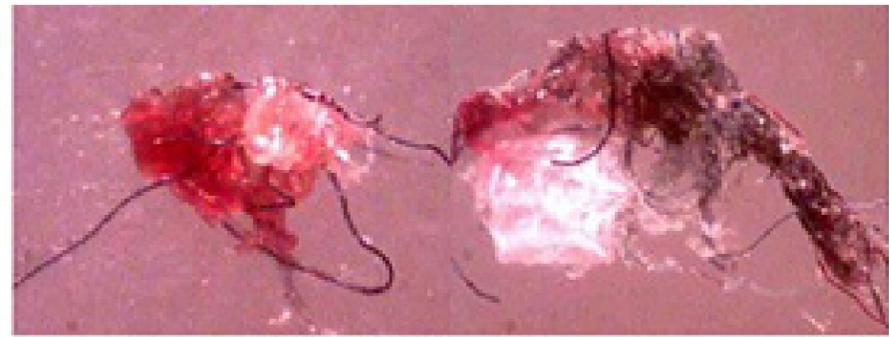
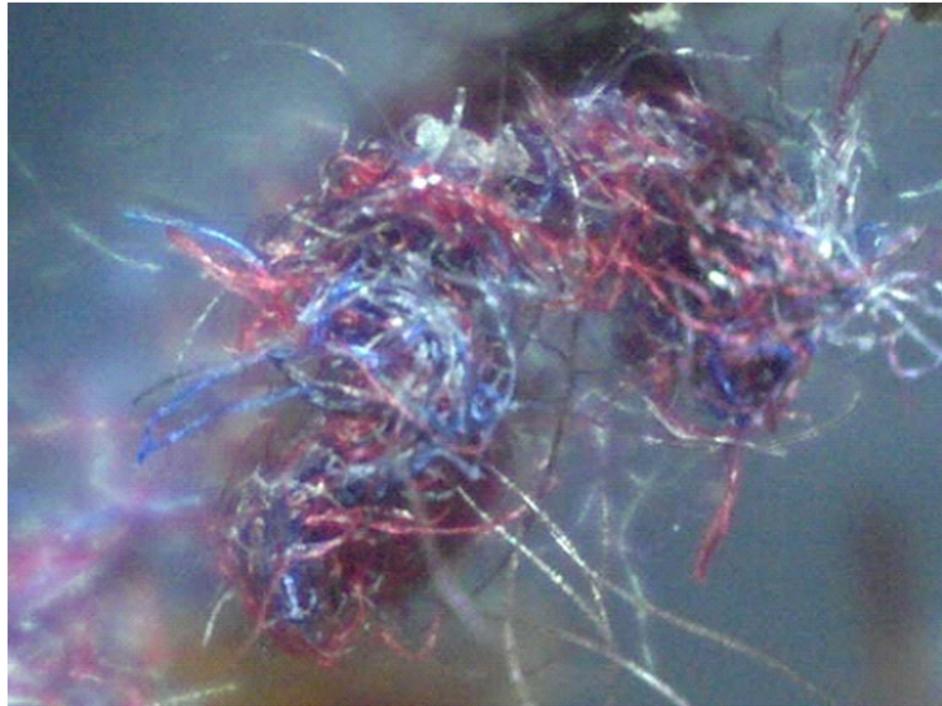
*"People with delusional parasitosis are very functional and rational except when it comes to this one issue," he says. "Many dermatologists would rather these patients never show up, because they don't feel they have the time to spend. No one knows how to deal with them."*

That attitude is a familiar one to Odom, who visited seven doctors between January 2005 and April 2006, trying to discover what was wrong with her. By that time the lesions had spread to her head, causing her hair to fall out in patches. Some of the doctors she saw diagnosed her with dermatitis, but most thought the problem was psychological and assumed she was scratching her skin and pulling out her own hair.

One prescribed Zoloft for depression, while others prescribed the anti-anxiety drug Xanax. (She refused to take the drugs.) One dermatologist (not Meffert) diagnosed her with delusional parasitosis. "He told me, 'You seem a little obsessed. Maybe you should go speak to somebody,'" she says.

Odom, a former softball coach and school aide, never doubted her mental health, although she acknowledges she grew "frantic and high strung" after realizing her doctors didn't believe her. She began isolating herself, fearing she might be contagious. "The worst fear for me was whether I was going to infect my children," she says. "I stopped hugging them and kissing them. I had a hard time preparing their food, thinking whatever I'm spewing out of my body is going to get into what I'm cooking."

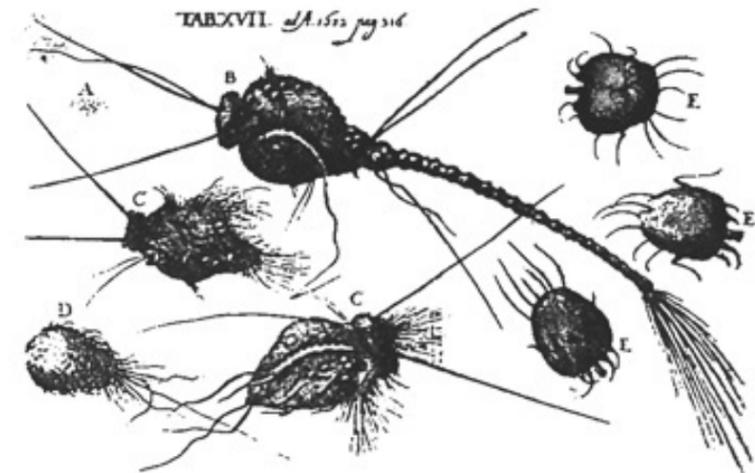
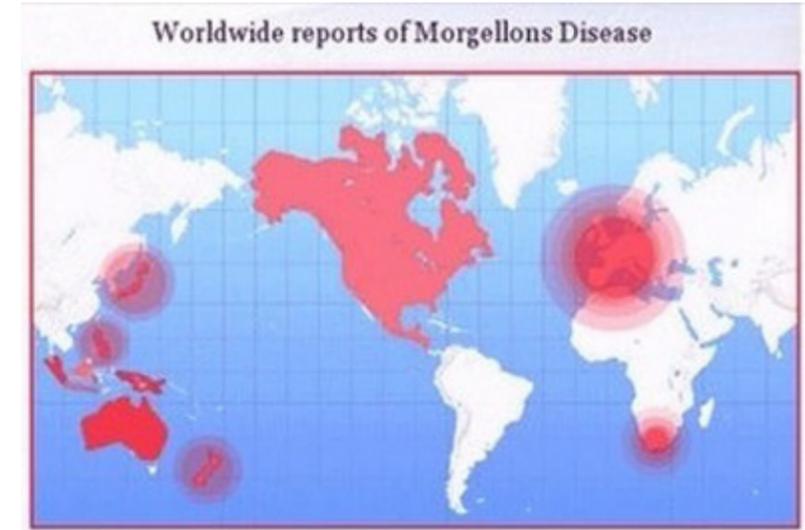




The Morgellons Research Foundation  
Fibers embedded in skin removed from facial lesion of three year old boy, 60x.



morgellonsusa.com  
Photo of the fibrous structures that were in the skin of a Morgellons sufferer.



## 24. Entamoeba Histolytica (Amoebiasis/Amoebic Dysentery)

Free-living protozoan groups that inhabit soils and natural waters are extremely diverse, not only in their structure but also in the manner in which they feed, reproduce, and move. The amoebas are a diverse group of free-living protozoa that probably evolved from a number of different primitive protozoan ancestors. The amoeboid group includes hundreds of different organisms, ranging in size from about .25 to 2.5 mm (about 0.0098 to 0.098 in). Amoebas are considered the most primitive animals and are classified in the kingdom Protista. All amoeboid organisms have thin cell membranes, a semirigid layer of ectoplasm, a granular, jellylike endoplasm, and an oval nucleus. Some species live on aquatic plants and some in moist ground; others are parasitic in animals and humans.

At least six forms of amoeba are parasitic in humans. Most important of these is *Entamoeba histolytica*, which causes amoebiasis and dysentery. The diseases often occur in epidemics when raw sewage contaminates water supplies or when soil is fertilized with untreated wastes.

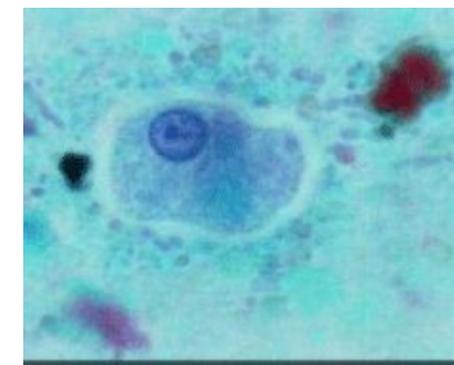
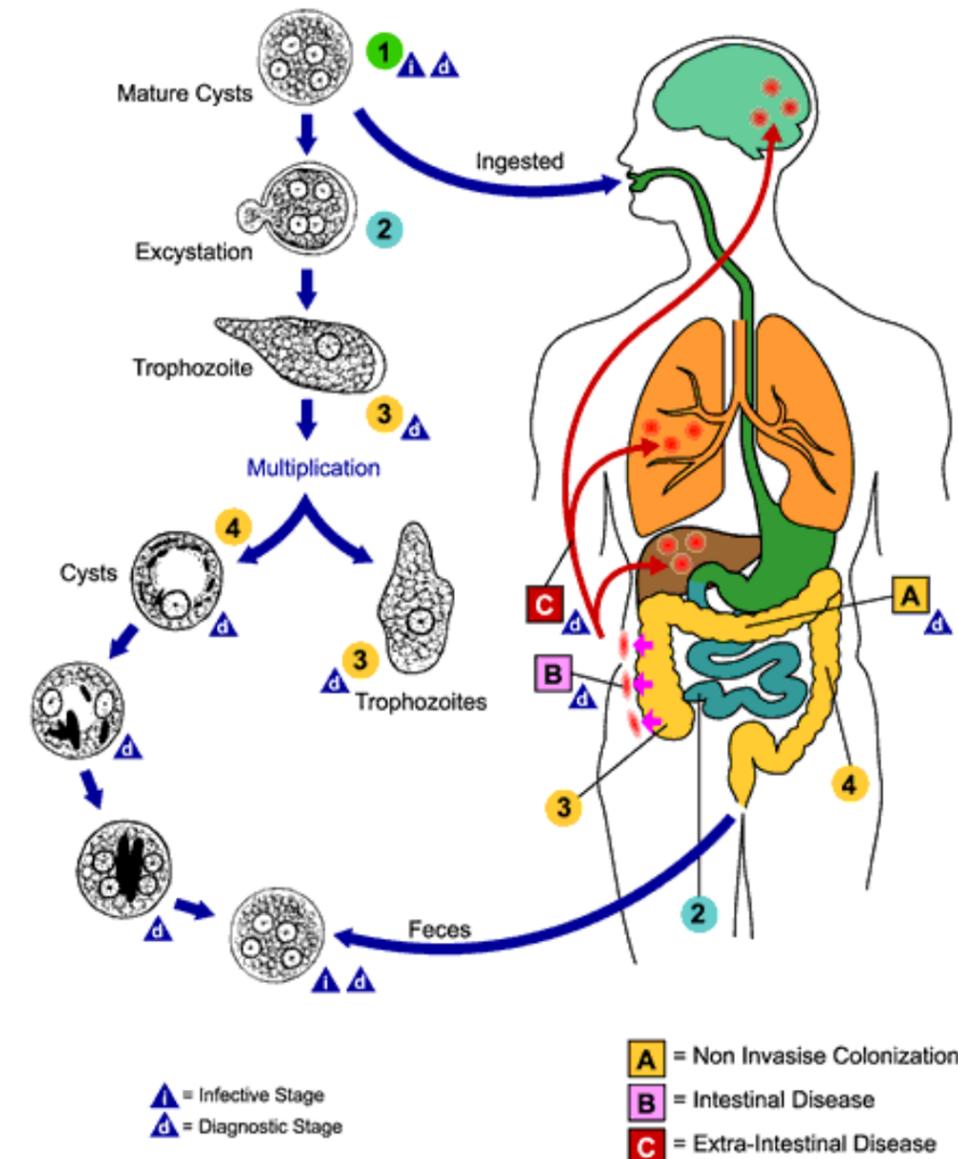
Amoebic dysentery is most commonly spread by water or contaminated, uncooked food or from carriers. Flies may carry the cysts to spread the amoeba from the feces of infected persons to food. In many publications *Entamoeba histolytica* is cited as infecting one tenth of the world population, or 500 million people.

*Life Cycle Diagram (Courtesy of the DPD)*

Infection by *Entamoeba histolytica* occurs by ingestion of mature cysts (1) in fecal contaminated food, water, or hands. Excystation (2) occurs in the small intestine and trophozoites (3) are released, which migrate to the large intestine. The trophozoites multiply by binary fission and produce cysts (4), which are passed in the feces. Because of the protection conferred by their walls, the cysts can survive days to weeks in the external environment and are responsible for transmission. (Trophozoites can also be passed in diarrheal stools, but are rapidly destroyed once outside the body, and if ingested would not survive exposure to the gastric environment.)

In many cases, the trophozoites remain confined to the intestinal lumen (A: non-invasive infection) of individuals who are asymptomatic carriers, passing cysts in their stool. In some patients the trophozoites invade the intestinal mucosa (B: intestinal disease), or, through the bloodstream, extra-intestinal sites such as the liver, brain, and lungs (C: extra-intestinal disease), with resultant pathologic manifestations. It has been established that the invasive and non-invasive forms represent two separate species, respectively *E. histolytica* and *E. dispar*, however not all persons infected with *E. histolytica* will have invasive disease.

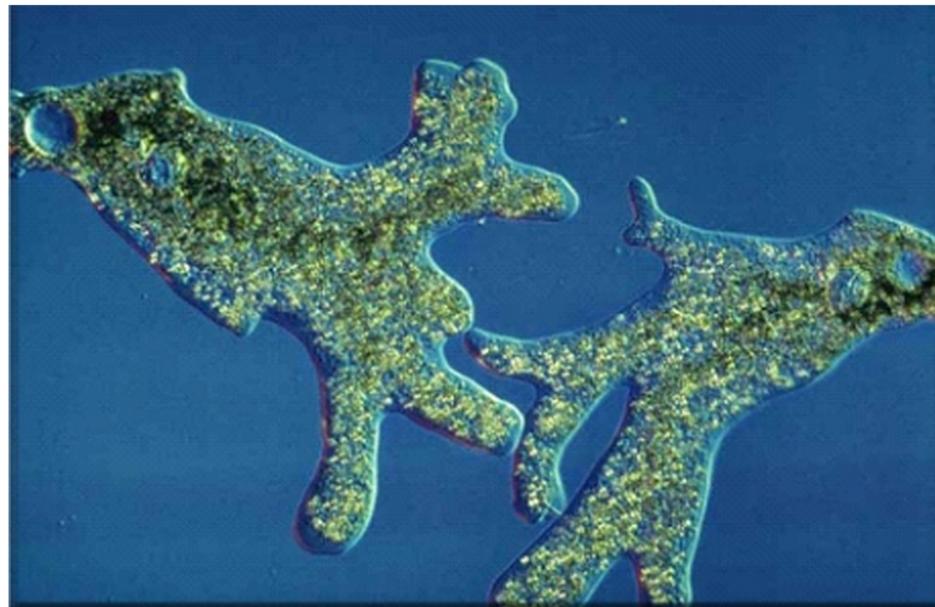
These two species are morphologically indistinguishable. Transmission can also occur through fecal exposure during sexual contact (in which case not only cysts, but also trophozoites could prove infective).



Trophozoite of *E. histolytica*



*Entamoeba Histolytica* Trophozoite.



## 25. Human Mycoses

Fungi cause a wide variety of diseases in humans, and the areas we discuss are listed below. You may also want to refer to the Infectious Disease Society of America-Mycoses Study Group (IDSA-MSG) Practice Guidelines for treating invasive mycoses. These cover aspergillosis, blastomycosis, candidiasis, coccidioidomycosis, cryptococcosis, histoplasmosis, and sporotrichosis and are available at the IDSA website. Finally, please be sure to refer to our legal disclaimer.

*(Site development note: our discussions are currently relatively superficial for all the infections except candidiasis.)*

- Aspergillosis
- Blastomycosis
- Candidiasis
- Coccidioidomycosis
- Cryptococcosis
- Histoplasmosis
- Paracoccidiomycosis
- Sporotrichosis
- Zygomycosis

### Miscellaneous Syndromes

These diseases are a little harder to classify as some of them are caused by one of several different fungi. Thus, even though they have a fungal-sounding name (e.g., *Tinea barbae*), you can't always expect to find a corresponding fungus named *Tinea barbosa*!

*Chromoblastomycosis*

*Eye Infections*

*Lobomycosis*

*Mycetoma*

*Nail, Hair, and Skin disease*

- Onychomycosis (*Tinea unguium*)
- Piedra
- Pityriasis versicolor
- *Tinea barbae*
- *Tinea capitis*
- *Tinea corporis*
- *Tinea cruris*
- *Tinea favosa*
- *Tinea nigra*
- *Tinea pedis*

*Otomycosis*

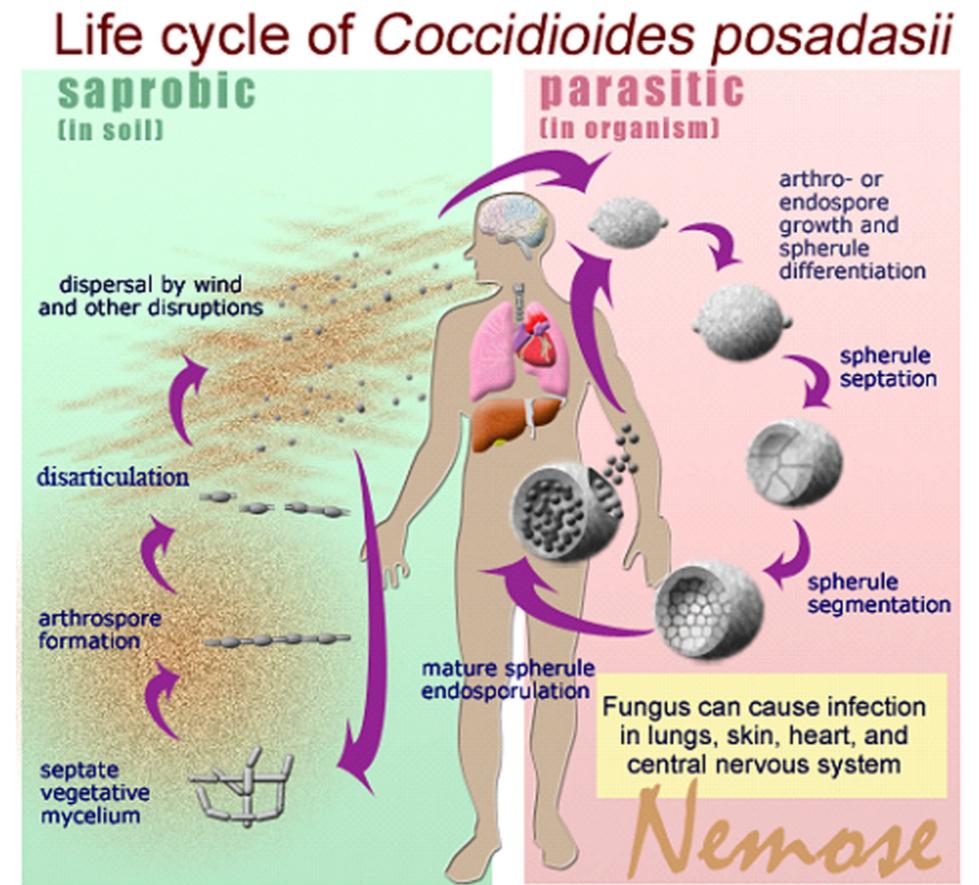
*Phaeohyphomycosis*

*Rhinosporidiosis*



*Alternaria alternata* Photo © George Barron

There are four common fungi causing allergies in humans: *Cladosporium*, *Penicillium*, *Aspergillus* and *Alternaria*. *Alternaria alternata* is an important cause of mould allergies in humans. It fruits in abundance over the surface of dying grasses and cereals. It is particularly common on corn leaves in the late fall when the straw-coloured leaves turn black with spores (conidia). Spores are dislodged during harvesting of the crop and are produced in such abundance (billions) that they form a dark cloud above the combine. Spores can affect sensitized individuals for many miles downwind. *Alternaria* is also found from time to time growing in damp spots on walls in homes, particularly in basements but it is not common

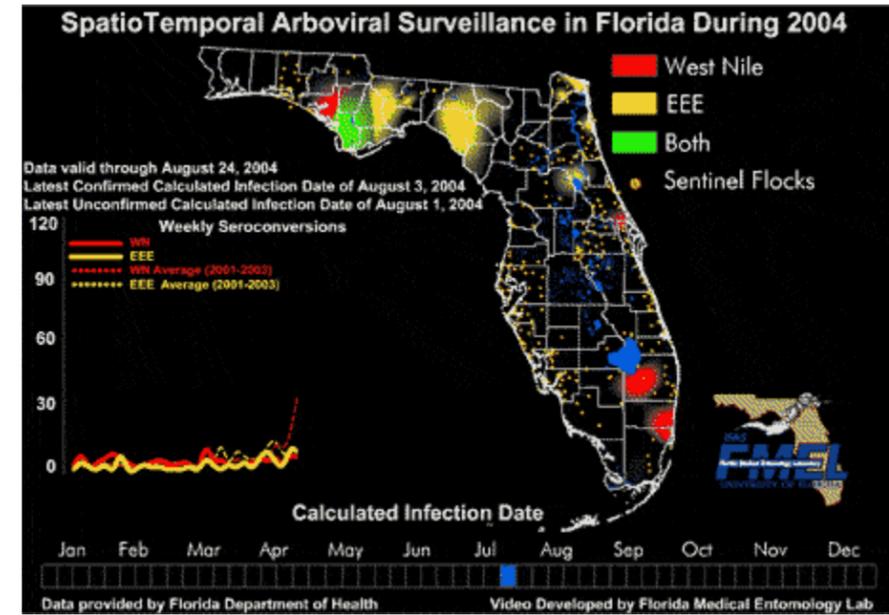
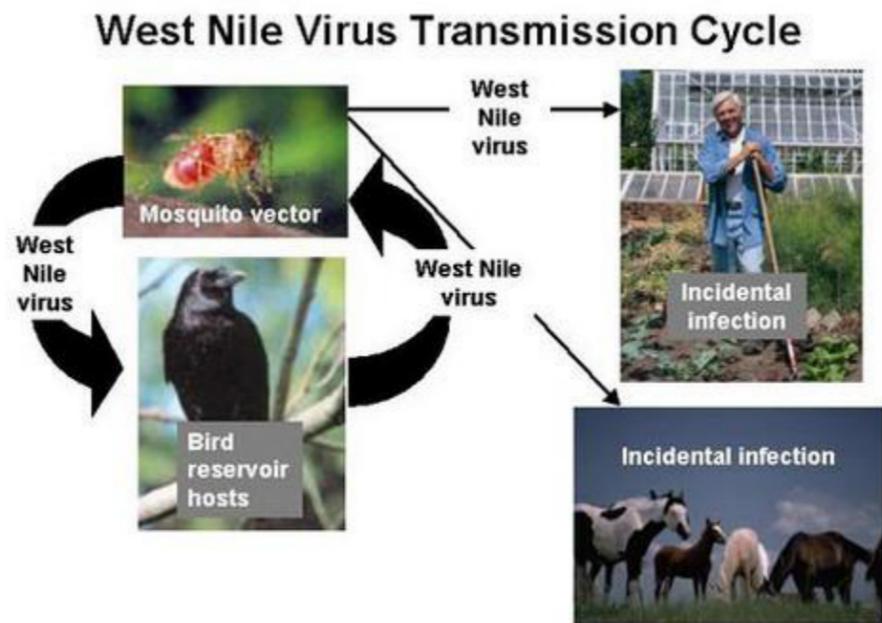


26. Mosquito diseases



TABLE 1. A brief synopsis of the major mosquito-borne diseases in Australia.

Disease	Agent	Host	Vector species	Geographical occurrence	Seasonal occurrence	Comment
Malaria	Plasmodium species: <i>P. falciparum</i> , <i>P. vivax</i> .	Man	<i>Anopheles farauti</i> s.l. <i>Anopheles annulipes</i> s.l. (but see Bryan and Russell, 1983)	Tropical Australia north of 19°S.	March-Sept.	Australia is Malaria free but remains vulnerable to reintroduction.
Filariasis	<i>Wuchereria bancrofti</i> .	Man	<i>Culex annulirostris</i> , <i>Culex quinquefasciatus</i> , <i>Anopheles farauti</i> s.l.	Coastal Queensland.		Period of endemic filariasis activity coincides with the use of Kanaka labour for sugar cane. It has now disappeared.
Dengue	Dengue viruses.	Man	<i>Aedes aegypti</i>	Queensland.	All year but with most cases in the January-June period.	Characterised by long absences and sudden severe outbreaks. Now confined to Queensland.
Australian encephalitis (AE)	Murray Valley encephalitis virus (MVEV) or Kunjin virus.	Birds, mammals, man is an occasional host.	<i>Culex annulirostris</i> , <i>Aedes normanensis</i> (?).	Mainland Australia except southwest of Western Australia and east of the Great Dividing Range.	Tropical Aust. has annual activity in March-June; south eastern Australia with infrequent epidemics in January-May.	Epidemics in SE Australia are associated with flooding in Murray-Darling basin.
Epidemic polyarthritis (EPA)	Ross River virus (RRV)	mammals, particularly macropods; man.	<i>Culex annulirostris</i> , <i>Aedes vigilax</i> , other species(?).	All Australia.	Throughout the year but with most in the January-May period.	Disease occurs as scattered cases in most years, with occasional severe outbreaks associated with excessive summer rainfall.



## Mosquito

From Wikipedia, the free encyclopedia

Mosquito	
A female <i>Culiseta longiarealota</i>	
Conservation status	
Secure	
Scientific classification	
Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Diptera
Suborder:	Nematocera
Infraorder:	Culicomorpha
Superfamily:	Culicoidea
Family:	Culicidae
Diversity	
41 genera	
Subfamilies	
Anophelinae Culicinae Toxorhynchitinae	

**Mosquito** (from the Portuguese meaning “small fly”) is a common flying insect in the family Culicidae that is found around the world. There are about 3,500 species of mosquitoes. They have a pair of scaled wings, a pair of halteres, a slender body, and six long legs. The females of most mosquito species suck blood (hematophagy) from other animals, which has made them the deadliest disease vector known, killing millions of people over thousands of years and continuing to kill millions per year by the spread of infectious diseases.

### 1. Development

Mosquitoes go through four stages in their life cycle: egg, larva, pupa, and adult or imago. The first three stages are aquatic and last 5–14 days, depending on the species and the ambient temperature. The adult females can live up to a month (or more in captivity) but most probably do not live more than 1–2 weeks in nature.



#### 1.1 Larvae

Anopheles larva from southern Germany, about 8 mm long

Mosquito larvae have a well-developed head with mouth brushes used for feeding, a large thorax with no legs and a segmented abdomen.

Larvae breathe through spiracles located on the 8th abdominal segment and therefore must come

to the surface frequently. The larvae spend most of their time feeding on algae, bacteria, and other microorganisms in the surface microlayer. They dive below the surface only when disturbed. Larvae swim either by jerky movements of the entire body, explaining their nickname “wigglers”, or through propulsion with the mouth brushes. Larvae also like very warm temperatures.

Larvae develop through 4 stages, or instars, after which they metamorphose into pupae. At the end of each instar, the larvae molt, shedding their exoskeleton, or skin, to allow for further growth.

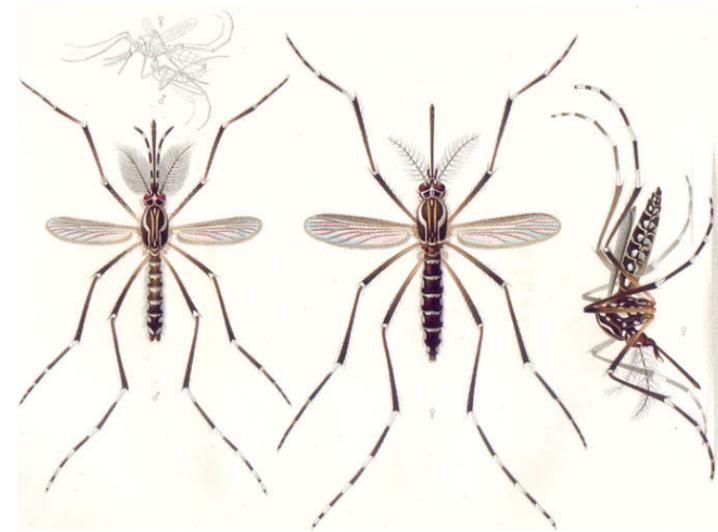
#### 1.2 Pupa

The pupa is comma-shaped in *Anopheles* when viewed from the side. The head and thorax are merged into a cephalothorax with the abdomen curving around underneath. As with the larvae, pupae must come to the surface frequently to breathe, which they do through a pair of respiratory trumpets on the cephalothorax. After a few days as a pupa, the dorsal surface of the cephalothorax splits and the adult mosquito emerges.

#### 1.3 Adult

Adults of the yellow fever mosquito *Aedes aegypti*, a typical member of the subfamily Culicinae. The male on the left, females on the right. Note the bushy antennae and longer palps in the male.

The duration from egg to adult varies considerably among species and is strongly influenced by ambient temperature. Mosquitoes can develop from egg to adult in as little as 5 days but



usually take 10–14 days in tropical conditions. The variation of the body size in adult mosquitoes depends on the density of the larval population and food supply within the breeding water. Adult flying mosquitoes frequently rest in grass, shrubbery or other foliage.

Adult mosquitoes usually mate within a few days after emerging from the pupal stage. In most species, the males form large swarms, usually around dusk, and the females fly into the swarms to mate.

Males live for about a week, feeding on nectar and other sources of sugar. Females will also feed on sugar sources for energy but usually require a blood meal for the development of eggs. After obtaining a full blood meal, the female will rest for a few days while the blood is digested and eggs are developed. This process depends on the temperature but usually takes 2–3 days in tropical conditions. Once the eggs are fully developed, the female lays them and resumes host seeking.

The cycle repeats itself until the female dies. While females can live longer than a month in captivity, most do not live longer than 1–2 weeks in nature. Their lifespan depends on temperature, humidity, and also their ability to successfully obtain a blood meal while avoiding host defenses.

### 2. Morphology

Length varies but is rarely greater than 16 mm (0.6 in), and weigh up to 2.5 mg (0.04 grain). A mosquito can fly for 1 to 4 hours continuously at up to 1-2 km/h travelling up to 12 km (7.5 mi) in a night.

All mosquitoes have slender bodies with 3 sections: head, thorax and abdomen.

#### 2.1 Head

The head is specialized for acquiring sensory information and for feeding. The head contains the eyes and a pair of long, many-segmented antennae. The antennae are important for detecting host odors as well as odors of breeding sites where females lay eggs. In all mosquito species, the antennae of the males in comparison to the females are noticeably bushier and contain auditory receptors to detect the characteristic whine of the female. The compound eyes are distinctly separated from one another. Their larvae only possess a pit-eye ocellus. The compound eyes of adults develop in a separate region of the head. New ommatidia are added in semicircular rows at the rear of the eye; during the first phase of growth, this leads to individual ommatidia being square, but later in development they become hexagonal. The hexagonal pattern will only become visible when the carapace of the stage with square eyes is molted. The head also has an elongated, forward-projecting stinger used for feeding, and two sensory palps. The maxillary

palps of the males are longer than their stingers whereas the females' maxillary palps are much shorter. (This is typical for representatives of subfamilies.) As with many members of the mosquito family, the female is equipped with an elongated proboscis that she uses to collect blood to feed her eggs.

## 2.2 Thorax

The thorax is specialized for locomotion. Three pairs of legs and a pair of wings are attached to the thorax. The insect wing is an outgrowth of the exoskeleton.

## 2.3 Abdomen

The abdomen is specialized for food digestion and egg development. This segmented body part expands considerably when a female takes a blood meal. The blood is digested over time serving as a source of protein for the production of eggs, which gradually fill the abdomen.

## 3. Feeding habits



Both male and female mosquitoes are nectar feeders, but the females of many species are also capable of hematophagy (drinking blood). Females do not require blood for their own survival, but they do need supplemental substances such as protein and iron to develop eggs.

In regards to host location, carbon dioxide and organic substances produced from the host, humidity, and optical recognition play important roles. In *Aedes* the search for a host takes place in two phases. First, the mosquito exhibits a nonspecific searching behavior

until the perception of host stimulants then it follows a targeted approach.

Mosquitos are crepuscular (dawn or dusk) feeders. During the heat of the day most mosquitoes rest in a cool place and wait for the evenings. They may still bite if disturbed. Mosquitos are adept at infiltration and have been known to find their way into residences via deactivated air conditioning units.

Prior to and during blood feeding, they inject saliva into the bodies of their source(s) of blood. Female mosquitoes hunt their blood host by detecting carbon dioxide (CO<sub>2</sub>) and 1-octen-3-ol from a distance.

*Aedes aegypti* vector of dengue fever and yellow fever

Mosquitoes of the genus *Toxorhynchites* never drink blood. This genus includes the largest extant mosquitoes, the larvae of which prey on the larvae of other mosquitoes. These mosquito eaters

have been used in the past as mosquito control agents, with varying success.

## 3.1 Saliva

In order for the mosquito to obtain a blood meal it must surmount the vertebrate physiological responses. The mosquito, as with all blood-feeding arthropods, has evolved mechanisms to effectively block the hemostasis system with their saliva, which contains a mixture of secreted proteins. Mosquito saliva affects vascular constriction, blood clotting, platelet aggregation, inflammation, immunity, and angiogenesis. Universally, hematophagous arthropod saliva contains at least one anticlotting, one anti-platelet, and one vasodilatory substance. Mosquito saliva also contains enzymes that aid in sugar feeding and antimicrobial agents to control bacterial growth in the sugar meal. The composition of mosquito saliva is relatively simple as it usually contains fewer than 20 dominant proteins. Despite the great strides in knowledge of these molecules and their role in bloodfeeding achieved recently, scientists still cannot ascribe functions to more than half of the molecules found in arthropod saliva. One promising application is the development of anti-clotting drugs based on saliva molecules, which might be useful for approaching heart-related disease, because they are more user-friendly blood clotting inhibitors and capillary dilators.

It is now well recognized that the feeding ticks, sandflies, and, more recently, mosquitoes have an ability to modulate the immune response of the animals (hosts) they feed on. The presence of this activity in vector saliva is a reflection of the inherent overlapping and interconnected nature of the host hemostatic and inflammatory/immunological responses and the intrinsic need to prevent these host defenses from disrupting successful feeding. The mechanism for mosquito saliva-induced alteration of the host immune response is unclear, but the data has become increasingly convincing that such an effect occurs. Early work described a factor in saliva that directly suppresses TNF- $\alpha$  release, but not antigen-induced histamine secretion, from activated mast cells. Experiments by Cross et al. (1994) demonstrated that the inclusion of *Ae. aegypti* mosquito saliva into naïve cultures led to a suppression of interleukin (IL)-2 and IFN- $\gamma$  production, while the cytokines IL-4 and IL-5 are unaffected by mosquito saliva. Cellular proliferation in response to IL-2 is clearly reduced by prior treatment of cells with SGE. Correspondingly, activated splenocytes isolated from mice fed upon by either *Ae. aegypti* or *Cx. pipiens* mosquitoes produce markedly higher levels of IL-4 and IL-10 concurrent with suppressed IFN- $\gamma$  production. Unexpectedly, this shift in cytokine expression is observed in splenocytes up to 10 days after mosquito exposure, suggesting that natural feeding of mosquitoes can have a profound, enduring, and systemic effect on the immune response.

T cell populations are decidedly susceptible to the suppressive effect of mosquito saliva, showing enhanced mortality and decreased division rates. Parallel work by Wasserman et al. (2004) demonstrated that T- and B-cell proliferation was inhibited in a dose dependent manner with concentrations as low as 1/7th of the saliva in a single mosquito. Depinay et al. (2005) observed a suppression of antibody-specific T cell responses mediated by mosquito saliva and dependent on mast cells and IL-10 expression. A recent study suggests that mosquito saliva can also decrease expression of interferon- $\alpha/\beta$  during early mosquito-borne virus infection. The contribution of type I interferons (IFN) in recovery from infection with viruses has been demonstrated in vivo by the therapeutic and prophylactic effects of administration of IFN-inducers or IFN, and recent research suggests that mosquito saliva exacerbates West Nile virus infection, as well as other mosquito-transmitted viruses.

### 3.2 Egg development and blood digestion

Two important events in the life of female mosquitoes are egg development and blood digestion. After taking a blood meal the midgut of the female synthesizes proteolytic enzymes that hydrolyze the blood proteins into free amino acids. These are used as building blocks for the synthesis of egg yolk proteins.

In the mosquito *Anopheles stephensi* Liston, trypsin activity is restricted entirely to the posterior midgut lumen. No trypsin activity occurs before the blood meal, but activity increases continuously up to 30 hours after feeding, and subsequently returns to baseline levels by 60 hours. Aminopeptidase is active in the anterior and posterior midgut regions before and after feeding. In the whole midgut, activity rises from a baseline of approximately 3 enzyme units (EU) per midgut to a maximum of 12 EU at 30 hours after the blood meal, subsequently falling to baseline levels by 60 hours. A similar cycle of activity occurs in the posterior midgut and posterior midgut lumen, whereas aminopeptidase in the posterior midgut epithelium decreases in activity during digestion. Aminopeptidase in the anterior midgut is maintained at a constant low level, showing no significant variation with time after feeding. alpha-glucosidase is active in anterior and posterior midguts before and at all times after feeding. In whole midgut homogenates, alpha-glucosidase activity increases slowly up to 18 hours after the blood meal, then rises rapidly to a maximum at 30 hours after the blood meal, whereas the subsequent decline in activity is less predictable. All posterior midgut activity is restricted to the posterior midgut lumen. Depending upon the time after feeding, greater than 25% of the total midgut activity of alpha-glucosidase is located in the anterior midgut. After blood meal ingestion, proteases are active only in the posterior midgut. Trypsin is the major primary hydrolytic protease and is secreted into the posterior midgut lumen without activation in the posterior midgut epithelium. Aminopeptidase activity is also luminal in the posterior midgut, but cellular aminopeptidases are required for peptide processing in both anterior and posterior midguts. Alpha-glucosidase activity is elevated in the posterior midgut after feeding in response to the blood meal, whereas activity in the anterior midgut is consistent with a nectar-processing role for this midgut region.

### 4. Distribution

*A mosquito inside a home in Victoria, Australia*



While many species are native to tropical and subtropical regions, some such as *Aedes* have successfully adapted themselves to cooler regions. In the warm and humid tropical regions, they are active the entire year long; however, in temperate regions they hibernate over winter. Eggs from strains in the temperate zones are more tolerant to the cold than ones from warmer regions. They can even tolerate snow and temperatures under

freezing. In addition, adults can survive throughout winter in suitable microhabitats.

### 4.1 Means of dispersal

Over large distances the worldwide distribution is carried out primarily through sea routes, in which the eggs, larvae, and pupae in combination with water-filled used tires and cut flowers are transported around. As with sea transport, the transport of mosquitoes in personal vehicles, delivery trucks, and trains plays an important role.

### 5. Disease

Mosquitoes are a vector agent that carries disease-causing viruses and parasites from person to person without catching the disease themselves.

*Anopheles albimanus* mosquito feeding on a human arm. This mosquito is a vector of malaria and mosquito control is a very effective way of reducing the incidence of malaria.

The principal mosquito borne diseases are the viral diseases yellow fever and dengue fever, transmitted mostly by the *Aedes aegypti*, and malaria carried by the genus *Anopheles*. Though originally a public health concern, HIV is now thought to be almost impossible for mosquitoes to transmit[citation needed].

Mosquitoes are estimated to transmit disease to more than 700 million people annually in Africa, South America, Central America, Mexico and much of Asia with millions of resulting deaths.



Methods used to prevent the spread of disease, or to protect individuals in areas where disease is endemic include Vector control aimed at mosquito eradication, disease prevention, using prophylactic drugs and developing vaccines and prevention of mosquito bites, with insecticides, nets and repellents. Since most such diseases are carried by "elderly" females, scientists have suggested focusing on these to avoid the evolution of resistance

### 6. Control



*Larvae in stagnant water / Mosquito killed by hand swatting*

There are many methods used for mosquito control. Depending on the situation, source reduction, biocontrol, larviciding (control of larvae), or adulticiding (control of adults) may be used to manage mosquito populations.

These techniques are accomplished using habitat modification, such as removing stagnant water and other breeding areas, pesticide like DDT, natural predators, (eg Dragonflies, larvae-eating fish), and trapping. Garlic Oil concentrate will repel mosquitos for up to 4 weeks.

## 7. Natural predators



Dragonflies are natural predators of mosquitoes.

The dragonfly eats mosquitoes at all stages of development and is quite effective in controlling populations. Although bats and Purple Martins can be prodigious consumers of insects, many of which are pests, less than 1% of their diet typically consists of mosquitoes. Neither bats nor Purple Martins are known to control or even significantly reduce mosquito populations. Some cyclopoid copepods are predators on 1st instar larvae,

killing up to 40 *Aedes* larvae per day. Larval *Toxorhynchites* mosquitoes are known as natural predators of other Culicidae. Each larva can eat an average of 10 to 20 mosquito larvae per day. During its entire development, a *Toxorhynchites* larva can consume an equivalent of 5,000 larvae of the first instar (L1) or 300 fourth instar larvae (L4) (Steffan & Evenhuis, 1981; Focks, 1982). However, *Toxorhynchites* can consume all types of prey, organic debris (Steffan & Evenhuis, 1981), or even exhibit cannibalistic behavior. A number of fish are also known to consume mosquito larvae, including bass, bluegill, catfish, fathead minnows, the western mosquitofish (*Gambusia affinis*), goldfish, guppies, and killifish.

Also, *Bacillus thuringiensis israelensis* has been used to control them as a biological agent.[citation needed]

## 8. Treatment of mosquito bites

Visible, irritating bites are due to an immune response from the binding of IgG and IgE antibodies to antigens in the mosquito's saliva. Some of the sensitizing antigens are common to all mosquito species, whereas others are specific to certain species. There are both immediate hypersensitivity reactions (Types I & III) and delayed hypersensitivity reactions (Type IV) to mosquito bites (see Clements, 2000).

There are several commercially available anti-itch medications, including orally, such as Benadryl, or topically applied antihistamines and, for more severe cases, corticosteroids such as hydrocortisone and triamcinolone. Many home remedies exist, including calamine lotion. Ammonia has been clinically demonstrated to be an effective treatment. Both using a brush to scratch the area surrounding the bite and running scalding hot water (around 49 °C) over it can alleviate itching for several hours by reducing histamine-induced skin blood flow. On the other hand, excessive scratching can irritate the bite and break the skin, leading to prolonged recovery and the possibility of infection or scarring.[citation needed]

## 9. Cultural views



*A mosquito in Baltic amber*

According to the "Mosquitoes" chapter in *Kwaidan: Stories and Studies of Strange Things*, by Lafcadio Hearn (1850–1904), mosquitoes are seen as reincarnations of the dead, condemned by the errors of their former lives to the condition of *Jiki-ketsu-gaki*, or "blood-drinking pretas".

## 10. Evolution

The Culicinae and Anopheles clades are believed to have diverged about 150 million years ago. The Old and New World Anopheles species are believed to have subsequently diverged about 95 million years ago.

## 11. Systematics

There are approximately 3,500 species of mosquitoes grouped into 41 genera. Human malaria is transmitted only by females of the genus *Anopheles*. Of the approximately 430 *Anopheles* species, while over 100 are known to be able to transmit malaria to humans only 30-40 commonly do so in nature. Since breeding and biting habit differ considerably between species, species identification is important for control programmes.

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## 27. Biting midges, no-see-ums

**scientific name:** *Culicoides spp. (Insecta: Diptera: Ceratopogonidae)*

**Introduction - Distribution - Description - Life Cycle - Medical Significance - Management and Prevention - Selected References**

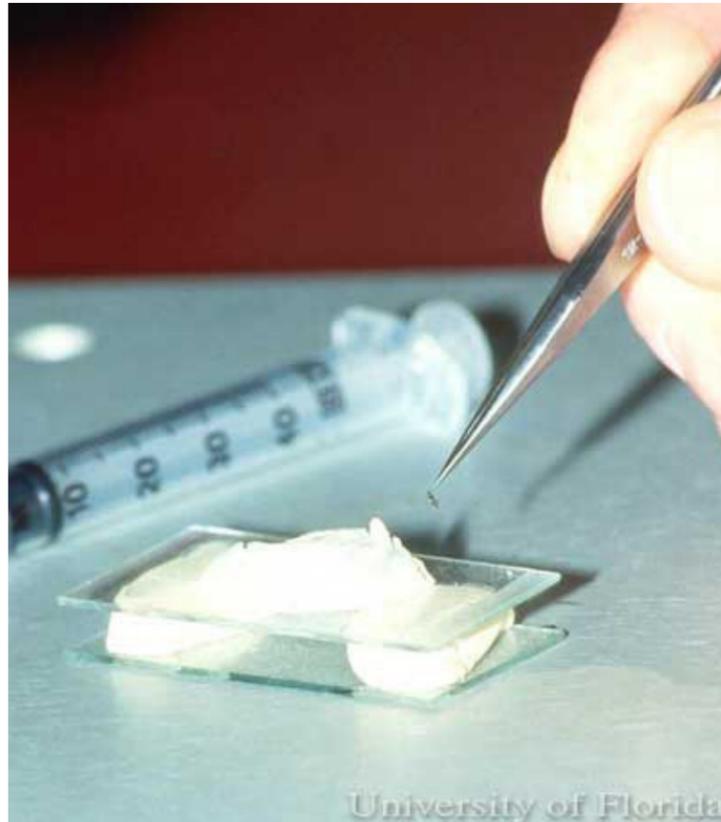
### Introduction

Biting midges can be a nuisance to campers, fishermen, hunters, hikers, gardeners, and others who spend time outdoors during early morning and evenings, and even during the daytime on still, cloudy days. They will readily bite humans; the bites are irritating, painful, and can cause long-lasting painful lesions for some people.

A common observation upon experiencing a bite from this insect is that something is biting, but the person suffering can not see what it is. Biting midges are sometimes incorrectly referred to as sand flies. Sand flies are insects that belong to a different biological group and should not be confused with the biting midges.

### Distribution

There are over 4,000 species of biting midges in the Ceratopogonidae family, and over 1,000 in just one genus, *Culicoides*. The distribution of midges in the genus *Culicoides* is world-wide; 47 species are known



to occur in Florida. Species belonging to the genus *Leptoconops* occur in the tropics, sub-tropics, the Caribbean, and some coastal areas of southeast Florida.

Breeding areas can be very varied depending on the particular species. Areas with substantial salt marsh habitat are major producers of many biting midge species. Additional sources for some species, like the bluetongue virus vector *Culicoides sonorensis* Wirth and Jones, include highly organic soil that is wet but not underwater such as those found with high manure loads in swine, sheep and cattle farming operations.

### Description

**Immature Stages:** The eggs can be cigar, banana, or sausage shaped and approximately 0.25 mm long. They are white when first laid but later turn brown or black. The eggs are laid on moist soil and cannot withstand drying out. Some species can lay up to 450 eggs per batch and as many as seven batches in a lifespan. Eggs typically hatch within two to 10 days of being laid; time to hatch is dependent on the species and temperatures.

The larvae are worm-like, creamy white, and approximately 2 to 5 mm long. Larvae develop through four instars; the first instar larvae possess a functional spine-bearing proleg. Pupal color can be pale yellow to light brown to dark brown. They are 2 to 5 mm in length with an unsegmented cephalothorax that has a pair of respiratory horns that may bear spines or wrinkles. During this stage, the insects possess a spiny integument which can be used to identify the fly to species level.

**Adults:** The adult no-see-ums are gray and less than 1/8 inch long. The two wings possess dense hairs and give rise to pigmentation patterns. These wing patterns are used by biologists to identify species. The large compound eyes are more or less contiguous above the bases of the 15-segmented antennae. The pedicel of the males' antennae houses the Johnston's organ. The mouthparts are well-developed with cutting teeth on elongated mandibles in the proboscis, adapted for blood-sucking in females, but not in males. The thorax extends slightly over the head, and the abdomen is nine-segmented and tapered at the end.

### Life Cycle

**Adults:** Biting midges are holometabolous, progressing from egg to larva to pupa, and finally to the adult stage. The complete cycle can occur in two to six weeks, but is dependent on the species and environmental conditions. The adults are most abundant near productive breeding sites, but will disperse to mate and to feed. The mean distance for female flight is 2 km, less than half of that distance for males.



Male *Culicoides* typically emerge before the females and are ready to mate when the female

emerges from the pupal stage. Mating typically occurs in flight when females fly into swarms of males and the insects are oriented end to end with the ventral parts of the genitalia in contact. Some species mate without swarming; instead, the males go to hosts where the female is likely to feed on blood; mating occurs when she finishes feeding.

*Eggs:* Males and females feed on nectar, but the females require blood for their eggs to mature. The females will blood-feed primarily around dawn and dusk; however, there are some species that prefer to feed during the day. Some species are autogenous and therefore may produce the first batch of viable eggs without a blood meal using reserves stored from the larval period; blood meals are required for subsequent batches of eggs.

The number of eggs produced varies among species and size of bloodmeal. For example, *Culicoides furens* (Poey) can lay 50 to 110 eggs per bloodmeal, and *C. mississippiensis* Hoffman, 25 to 50 eggs per bloodmeal. The adults can live two to seven weeks in a laboratory setting, but only a few weeks under natural conditions.

*Larvae:* Larvae require water, air and food and are not strictly aquatic or terrestrial. They cannot develop without moisture. The larvae are present in and around salt-marsh and mangrove swamps, shores of streams and ponds, in muddy substrates, and feed on small organisms. Most species cannot exist more than a few inches below the air-water interface.

In the tropics, the larval habitat of many species is in rotting fruit, bromeliads, and other water-holding plants. Other larval habitats include mud, sand, and debris at edges of ponds, lakes and springs, treeholes, and slime-covered bark. The larval stage can last from two weeks to a year, depending on the species, temperatures, and geographic area.

*Pupae:* The pupal stage typically lasts ~ two to three days.

### Medical Significance

In the U.S., the biting midges are primarily a nuisance and the major medical issue associated with *Culicoides* is allergic reactions to the bites. However, like other blood feeding Diptera, *Culicoides* species are vectors of pathogens that can cause disease in humans and animals. In Central and South America, western and central Africa, and some Caribbean islands, biting midges are the vectors of filarial worms in the genus *Mansonella*. These parasites cause infection in humans that produces dermatitis and skin lesions because the adult worms are located in the skin.

Biting midges, primarily the species *Culicoides sonorensis*, are responsible for transmission of bluetongue virus to sheep and cattle in the U.S. Bluetongue is a serious disease of ruminants. Bluetongue viruses are found world-wide and are transmitted by different *Culicoides* species in different regions. Many countries that are bluetongue free prohibit the movement of livestock from bluetongue endemic regions. The annual economic damage in lost trade is in the millions of dollars.

Other animal disease causing pathogens transmitted by the bite of infected biting midges include African Horsesickness virus in equines that is confined primarily to Africa and Epizootic Hemorrhagic Disease virus in ruminants found in North America and principally having lethal effects on deer. Some equines experience allergic reactions to the bites, resulting in equine allergic dermatitis, affecting the withers, mane, tail and ears of the animal.

### Management and Prevention

Historically, management methods included diking and drainage of marshlands to reduce the habitats used by the immature stages. The insecticide DDT was used to target the adult stage. Currently, larval habitats are not targeted in control efforts because of the extensive amount of area that the habitats may cover, some negative environmental impacts resulting from changing water flow patterns of large areas, and the spotty spatial distribution of larvae within a given habitat.

Applications of insecticides targeting the adult stage are not efficient. While this type of application may kill biting midges active on a given night, they are continually dispersing from the larval habitat and entering areas of human activity. It would require insecticide applications on a daily basis in some areas, and this is not efficient or environmentally sound. Many government agencies that provide mosquito control services receive complaint calls about biting midges. However, most of the programs are not mandated or allowed to respond by providing control measures.

On a large scale, removal trapping is conducted using CO<sub>2</sub> as an attractant to lure the biting midges to an insecticide-treated target where they are killed. Research from the IFAS Florida Medical Entomology Laboratory showed that biting midge populations were reduced in test areas of Vero Beach and Boynton Beach, FL, and Castaway Cay, Bahamas. This method of control is more appropriate for islands and specific inland areas where pest control personnel can make a long term commitment to this technique.

Homeowners can install proper screening for windows and patios to prevent no-see-ums from entering residences and outdoor areas used for leisure and entertaining. Most biting midges can pass through 16-mesh insect wire screen and netting, so a smaller mesh size is required. The small mesh size does limit air flow through the screens, and an alternative is to treat screens with a long-lasting insecticide that will be fatal to the no-see-ums that land on the screen. Additionally, because no-see-ums are so small and are weak fliers, ceiling and window fans can be used at high speeds to keep no-see-ums out of small areas.

Repellents containing DEET (N,N-diethyl-meta-toluamide) typically used as mosquito repellents are also labeled for use against no-see-ums and can be applied prior to exposure to the biting midges. It is important that the directions for application that are printed on the label are followed for any product used as a repellent.

Coastal areas provide primary habitat for biting midges. Tourists and potential home and land owners can consult local maps prior to visiting or purchasing property in coastal areas, to determine the proximity to biting midge producing areas. It is prudent to research the area of geographic interest prior to making decisions that can lead to an unpleasant vacation or unhappy homeowners. Knowing the breeding habitats, and that large scale control operations are not feasible, one can be prepared with repellents or make decisions to build, or visit, elsewhere.

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## 28. Ticks

Ticks are the leading carriers (vectors) of diseases to humans in the United States, second only to mosquitoes worldwide. It is not the tick bite but the toxins, secretions, or organisms in the tick's saliva transmitted through the bite that causes disease.

Ticks are arthropods, like spiders. There are more than 800 species of ticks throughout the world.

Two families of ticks, Ixodidae (hard ticks) and Argasidae (soft ticks), are important to humans because of the diseases or illnesses they can transmit or cause. Hard ticks have a tough back plate or scutum that defines their appearance. The hard ticks tend to attach and feed for hours to days. Disease transmission usually occurs near the end of a meal, as the tick becomes full of blood. Soft ticks have more rounded bodies and do not have the hard scutum found in hard ticks. These ticks usually feed for less than one hour. Disease transmission from these ticks can occur in less than a minute. The bite of some of these ticks produces intensely painful reactions. Ticks can transmit disease to many hosts; some cause economic harm such as Texas fever (bovine babesiosis) in cattle that can kill up to 90% of yearling cows.

The following is a list of tick-borne diseases, the usual tick vector(s), and the pathogen(s) the tick transmits:

- **Lyme disease** -- Ixodes species including deer ticks (hard ticks) -- vectors for Borrelia species of bacteria
- **Babesiosis** -- Ixodes species (hard ticks) -- vectors for Babesia, a protozoan
- **Ehrlichiosis** -- Amblyomma americanum or lone star ticks (hard ticks) -- vectors for Ehrlichia chaffeensis and Ehrlichia ewingii bacterial species
- **Rocky Mountain spotted fever** -- Dermacentor variabilis (American dog tick) and Rocky Mountain wood tick (Dermacentor andersoni) (hard tick) are the primary vectors and occasionally the brown dog tick (Rhipicephalus sanguineus); Amblyomma cajennense (hard tick) is the vector in countries south of the United States -- vectors for Rickettsia bacteria

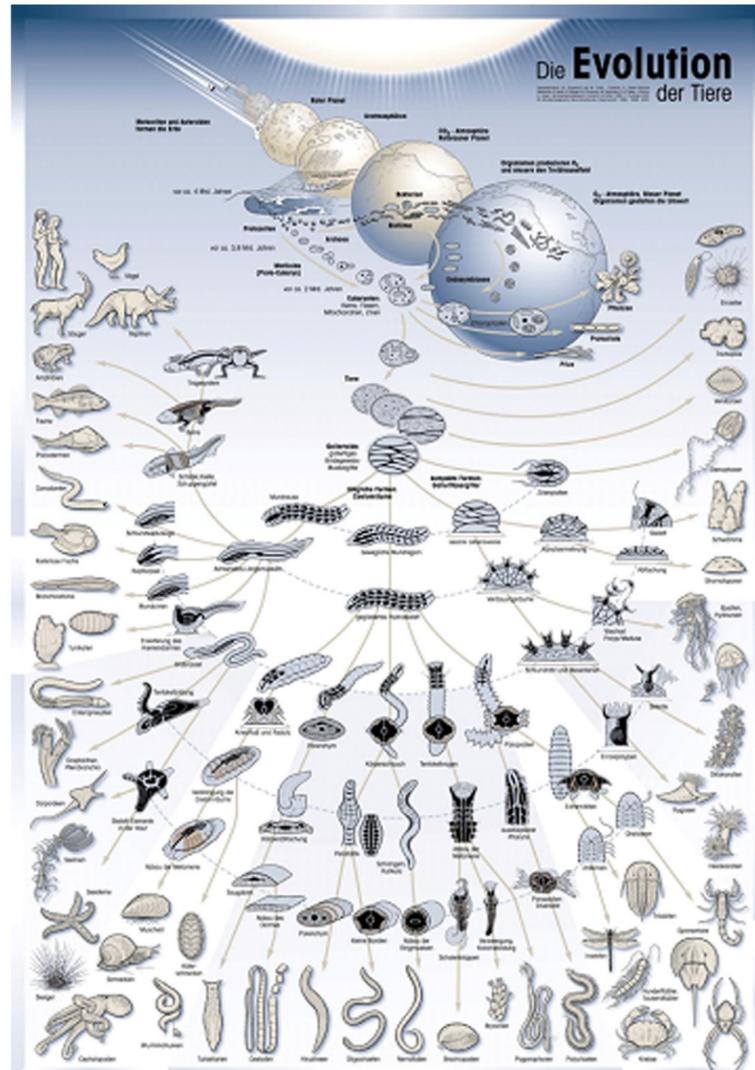
- **Southern tick-associated rash illness (STARI)** -- Amblyomma americanum or lone star tick (hard tick) -- infectious agent not yet identified according to U.S. Centers for Disease Control and Prevention (CDC)
- **Tick-borne relapsing fever** -- Ornithodoros moubata or African tick (soft tick) -- vectors for Borrelia species of bacteria
- **Tularemia** -- Dermacentor variabilis (American dog tick) (hard tick) and Amblyomma americanum or lone star tick (hard tick) - vectors for Francisella tularensis bacteria
- **Anaplasmosis** (human granulocytic anaplasmosis or HGA) -- Ixodes species (hard tick) -- vectors for Anaplasma phagocytophilum bacteria
- **Colorado tick fever** -- Dermacentor andersoni (hard tick) -- vectors for Coltivirus, a RNA virus
- **Powassan encephalitis** -- Ixodes species and Dermacentor andersoni (both hard ticks) -- vectors for Powassan encephalitis virus, an RNA arbovirus
- **Q fever** -- Rhipicephalus sanguineus, Dermacentor andersoni, and Amblyomma americanum (all three are hard ticks) -- vectors for Coxiella burnetii, a bacterium

Outbreaks of tick-related illnesses follow seasonal patterns (about April to September in the U.S.) as ticks evolve from larvae to adults. Ticks go through life cycles that involve mating and larval formation and usually have several hosts; the last Web citation shows the complicated life cycles of ticks. Ticks hide in low brush; this location allows them to physically contact a host. A recent study suggested that leaning against a tree or sitting on an old log was the quickest way to acquire ticks (about 30 seconds) in tick-infested areas. Ticks require a "blood meal" to grow and survive, and they are not very particular upon whom or what they feed. If ticks don't find a host, they may die.

- Once a tick finds a host (such as a human, a pet dog or cat, a deer, or a rabbit) and finds a suitable site for attachment, the tick begins to burrow with its mouthparts into exposed skin. Tick mouthparts are barbed, which helps to secure them to the host.
- Often the tick secretes "cementum" to more firmly attach its mouthparts and head to the host. Ticks may secrete or regurgitate small amounts of saliva that contain neurotoxins. These nerve poisons cleverly prevent the host from feeling the pain and irritation of the bite. Consequently, individuals may never notice the tick bite or its feeding. The saliva may contain a blood thinner to make it easier for the tick to get its blood meal. Some people are allergic to these secretions and may have a quick and severe allergic reaction to a tick bite.

The approximate sizes of microbes can be approximated by using the following rule of thumb:

- **VIRUSES** are the smallest of all infectious agents, averaging about 100 nanometers (100 billionths of a meter) in length. They have so few genes and proteins of their own that in order to reproduce they need to commandeer the machinery of the cells they invade.
- **BACTERIA** vary widely in size and shape, but tend to be at least 10 times larger than viruses, or at least 1 micrometer (1 millionth of a meter) long. They are single-cell organisms that reproduce independently.
- **SINGLE-CELL ORGANISMS** tend to be at least 10 times larger than bacteria, or about .01 millimeter long.
- **MULTI CELLULAR ORGANISMS** are so large they can usually be seen with the naked eye. Tapeworms, for instance, can reach a length of 6 meters (20 feet).



Food and water are the most common sources of parasite and invading organism transmission. Since most of us eat three times a day and drink water frequently throughout the day, our exposure to these sources is constant. Tap water has been found to be contaminated with harmful organisms. Both plant and animal foods carry parasites, and cleaning and cooking methods often do not often destroy them before ingestion. The CDC (Center for Disease Control) cites food as the catalyst behind 80 percent of the pathogenic outbreaks in the U.S. Most are linked to restaurants and delis where less than sanitary conditions exist -- from food preparation and storage to the utensils and servers' hands.



Animals, just like humans, can become infected with parasites and unhealthy organisms. Internally, contaminated water and food can spread the problem to our pets. Externally, animals become infected by organisms on their bodies, especially on their fur, because of exposure to infected animal wastes. Forgetting to wash your hands even one time after handling or cleaning up after your animal can transmit the parasite to you. Pets are a wonderful part of our lives. They provide comfort, companionship, protection, amusement, and unconditional love for their owners. Yet, pets, like humans, are often victims of serious infections that can unintentionally be passed on to their owners. In fact, there is a whole set of diseases classified as 'zoonoses' (animal-transmitted diseases) in parasitology textbooks. Animals are major carriers of harmful organisms, and most physicians, let alone the general public, are seemingly unaware of this fact. Experts have projected that of the 110 million pet dogs and cats in this country, over half may be infected with at least one or more different kinds of harmful organisms. Considering these numbers, the potential for transmission of parasitological invading organism infection from animals to humans is extremely high. Making a parasite cleanse an essential part of an effective health maintenance program for both people and animals alike.



(trematoda).



The CDC estimates that the number of parasites present in the United States alone number in the thousands. These harmful organisms are biochemically complex creatures in their life histories, development, reproductive cycles, nutritional requirements, and manifestation. They are categorized according to structure, shape, function, and reproductive ability. These include microscopic organisms (protozoa); roundworms, pinworms, whipworms, and hookworms (nematoda); tapeworms (cestoda); and flukes

**PROTOZOA**

Making up approximately 70 percent of all invading organisms, protozoa are invisible to the naked eye. They are one-celled microscopic organisms, but don't let their size fool you. Certain protozoans, through their intensely rapid reproductive ability, can take over the intestinal tract of their host; and from there go on to other organs and

tissues. Some feed on red blood cells. Some protozoa produce cysts - closed sacs in which they may be safely transported through food and water from one person to another. In the cyst state, protozoans are safe from destruction by human digestive juices. These one-celled 'vampires' can actually destroy the tissues of their hosts. According to experts, an estimated 7 million people across the U.S. have some form of protozoa living inside of them. Common protozoa include: Endolimax nana, Giardia lamblia, Entamoeba histolytica, Cryptosporidium parvum, Blastocystis hominis, Trichomonas vaginalis, Toxoplasma gondii, Cyclospora cayetanensis, Cryptosporidium muris, Pneumocystis carinii, Plasmodium malariae, Plasmodium ovale, Plasmodium vivax, Plasmodium falciparum, Leishmania donovani, Leishmania tropica, and Leishmania braziliensis.

**NEMATODE**



While the protozoans are only single-celled, nematode creatures are multi cellular. The adult worms multiply by producing eggs called ova or larvae. The eggs usually become infectious in soil or in an intermediate host before humans are infected. It is interesting to note that unless the worm infection is heavy, many individuals do not show signs of infestation.

While it may be unpleasant to consider, it is true that the human host can coexist quite comfortably with a few worms, unless they reproduce in great numbers and create organ obstruction. Experts claim that 'some type of worm is already in the intestines of over 75 percent of the world's population'. This is a frightening statement.

Common nematode include: Roundworm (Ascaris lumbricoides), Hookworm (Necator Americanus, Ancylostoma duodenal), Pinworm (Enterobius vermicularis), Roundworm (Toxocara canis, Toxocara cati), Heart worm (Dirofilaria immitis), Strongyloides (Stronglyoides stercoralis), Trichinella (Trichinella spiralis), Filaria (Wuchereria bancrofti, Brugia malayi, Onchocerca volvulus, Loa loa, Mansonella streptocerca, Mansonella perstans, Mansonella ozzardi), and Anisakine larvae.

**CESTODA**



Among the oldest known parasites, tapeworms are considered humanity's largest intestinal inhabitant. They each have a scolex (head) that attaches to the intestinal wall. As long as the head remains attached to the intestinal mucosa, a new worm can grow from it. Tapeworms do not contain digestive tracts but get their nourishment by absorbing partially digested substances from the host. They are whitish in color, flat, and ribbon-like, with a covering that is a transparent skin-like layer. Common cestoda

include: Beef tapeworm (Taenia saginata), Pork tapeworm (Taenia solium), Fish tapeworm (Diphyllobothrium latum), and Dog tapeworm (Dipylidium caninum).

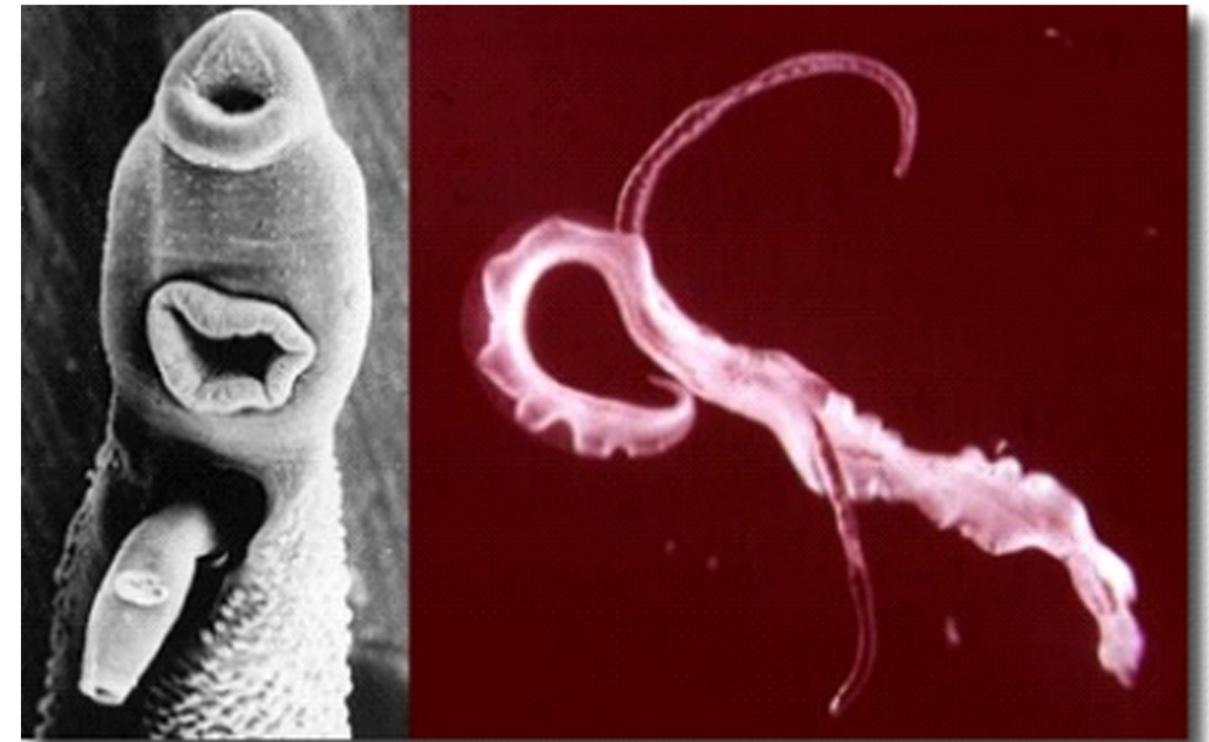
**TREMATODE**



Trematode are leaf-shaped flatworms also known as flukes.

They are parasitic during nearly all of their life-cycle forms. The cycle begins when larvae are released into freshwater by infected snails. The free-swimming larvae can then directly penetrate the skin of the human host or are ingested after encysting in or on various edible, vegetation, fish, or crustaceans.

Common trematode include: Intestinal fluke (Fasciolopsis buski), Blood fluke (Schistosoma japonicum, Schistosoma mansoni) Schistosoma haematobi um), Liver fluke (Clonorchis sinensis), Oriental lung fluke (Paragonimus westermani), and Sheep liver fluke (Fasciola hepatica).



*The following pictorial gallery shows what a few of the commonly known invading organisms look like, that may also call the humane body home...*



Roundworm



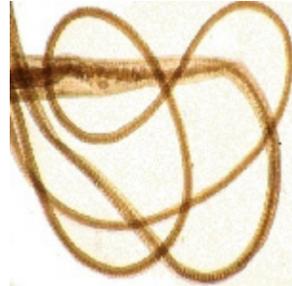
Pinworm



Hookworm



Dwarf Tape worm



Whipworm



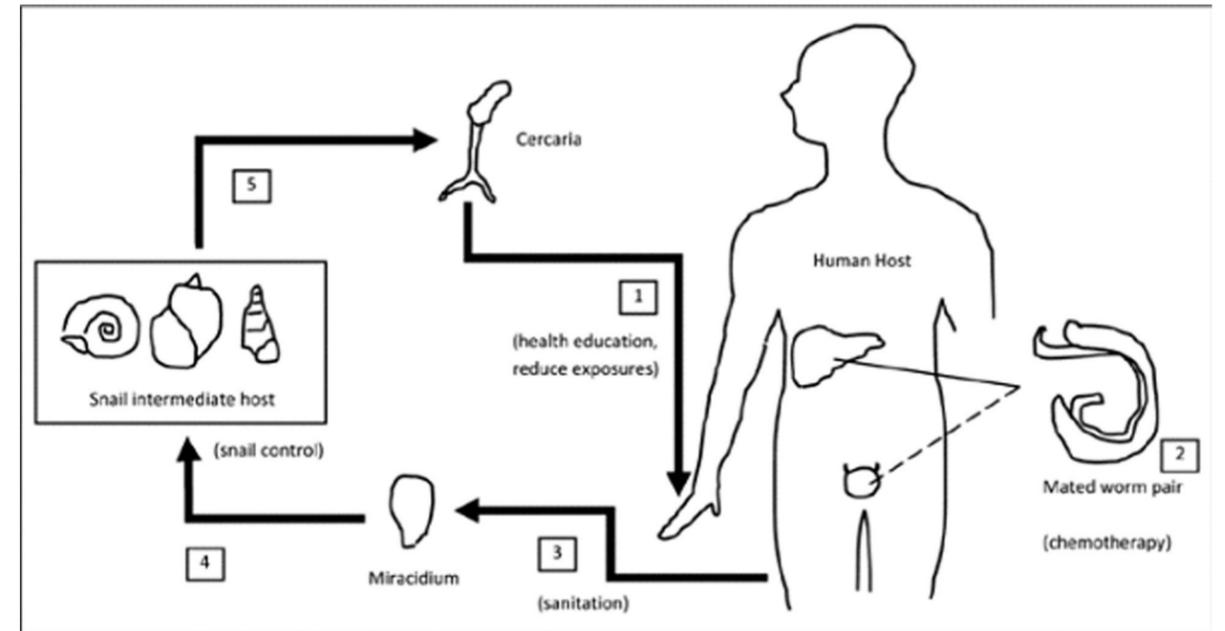
Fish Tapeworm

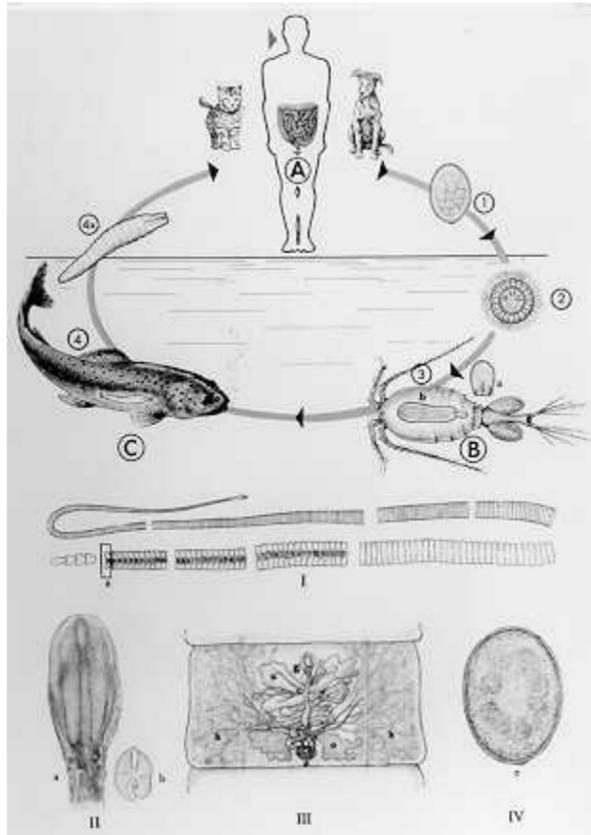


Intestinal Fluke

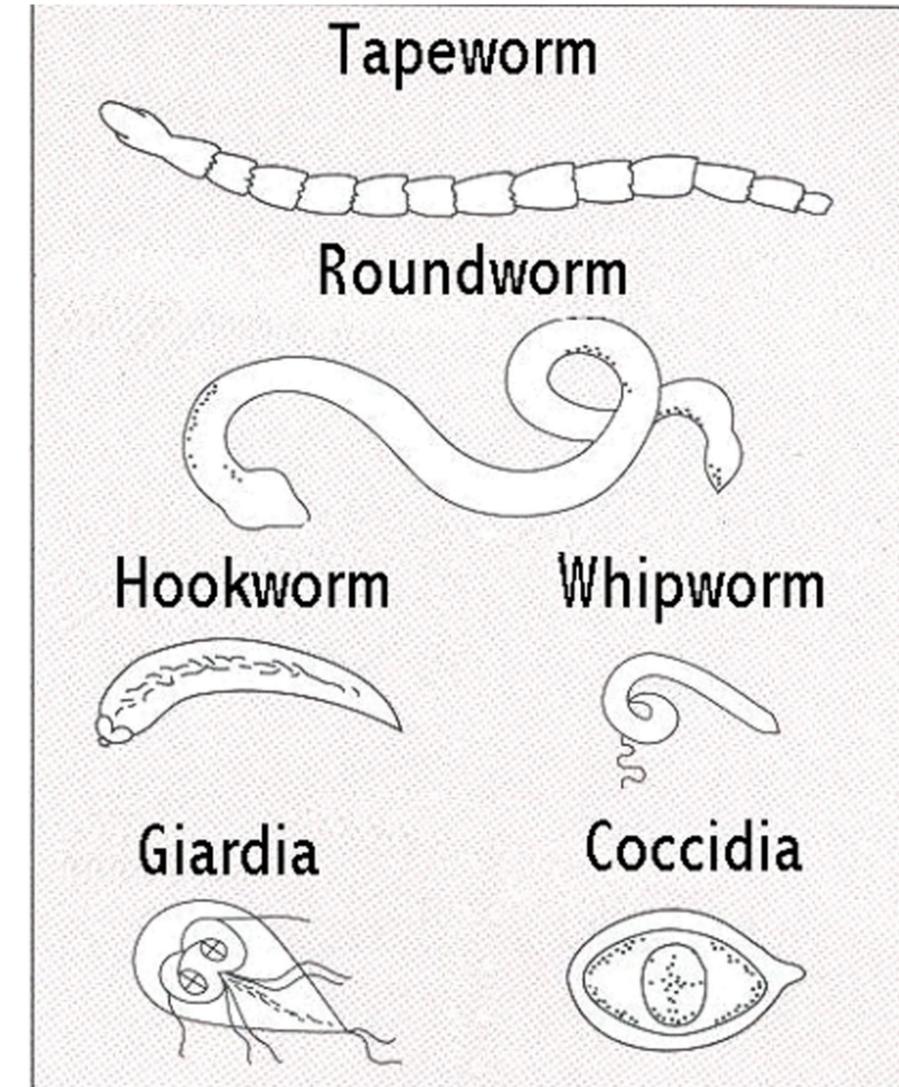
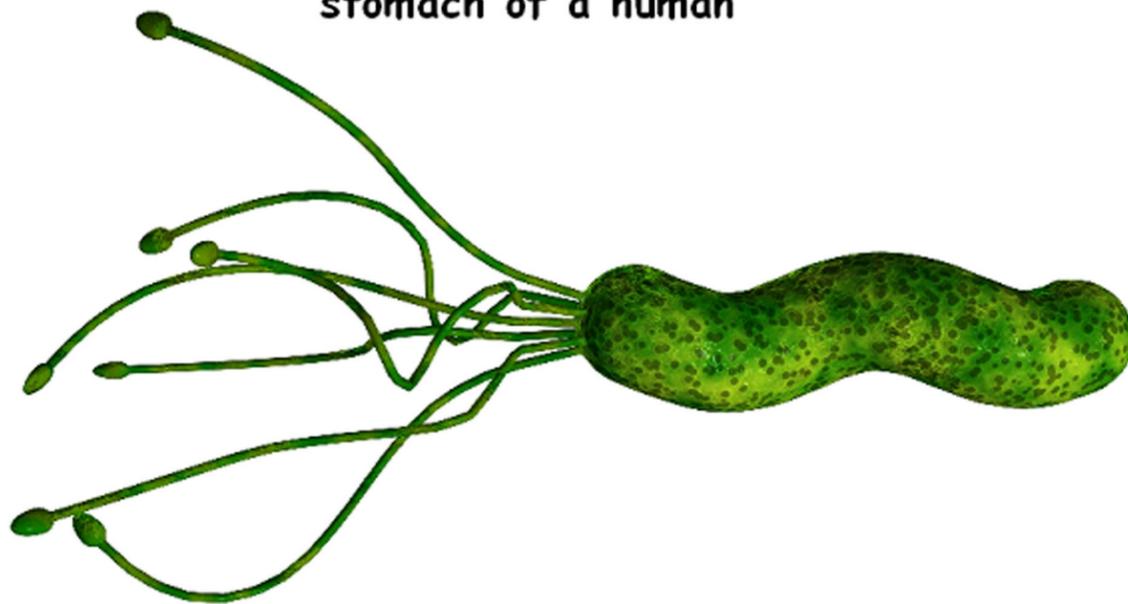


Amoeba Organisms





These worms can live in the stomach of a human



This little review of some of the creatures that can infect our bodies, I hope has been insightful. I hope you are concerned but don't be over concerned. This is natural. We should live in harmony and symbiosis with God's creatures. The problem comes when our immune system cannot control the harmony and the symbiosis leads to opportunistic invasion of an intruder. Then a symbiotic friend turns to a greedy invader.

All of these creatures have unique trivector field signatures. The fields are magnetic in some of their components. We have found that a trivector magnetic field on the body can boost the natural immune field and help to repulse and increase the natural defense. This technology is the SHOOO technique, developed by Desire' Dubounet. Read the scientific article on this to learn more.

We hope that this little tour of the possible internal landscape of invaders is helpful to you and increases your appreciation for care and health. Good prevention, once a year natural deworming, and good nutrition are all helpful at keeping harmony with the world around us and the world in and on us.

## Therapy

As I travel the world lecturing to doctors and shooting movies, I always stop at a local pharmacy to see what type of worm or parasite medicines they use in their locale. This is interesting and before I bring back something which has no solution in my homeland I should be prepared as my scoutmaster once said to help me and my family. Everywhere there are worms. There are more worms than any other living thing on this planet by volume. This truly is the planet of the worms and we are just symbiotic creatures trying to live in harmony with them. But we all need to once a year de-worm and not allow them to over proliferate.

Most worm infestations start with simple barefoot on ground with worms or flukes. Even with no breaks in the skin they can intrude. Contact with animals and where animals defecate in a problem. Be careful wash and have fun.

I have found formulas with cloves, goldenrod and goldenseal root, Silver, Aloe-Aloe, Gold-Copper, black walnut, Wormwood, Chinese Honeysuckle, Pumpkin seeds, anise seeds, cayenne, curry, paprika. People tend to eat more spicy foods in areas with more worms for a reason, Health. Many of these are simple foods that can be used more in the diet, but some of the herbs are strong and should be used once a year and with caution. To kill the eggs a one month use of light herbs can flush out the worms and effectively de-worm your client or child.

I try to get the family to eat spicy things. Slowly at first, then more and more. Spicy foods scare away the start of an infestation, but it will not discourage a full bore infestation. We minimize barefoot on dirt, eat at good restaurants, never at street stands where the seller often has no time to wash his hands, never eat fast foods, we eat good foods not shit foods, and we use good caution when dealing with foreign animals. Since my children love animals after contact we need to be ready with a safe natural local parasite program.

Humans are made to eat good nutrition, worms are made to eat shit from the ground. When you eat shit poor foods it does not feed you but the worms thrive on it. Avoid bad sugars and bad oils. Eat for you not the worm.

*Here are some herbs for you or your pet.*

### **Green Pharmacy for Worms**

Mainstream medicine uses a variety of drugs to treat worms. They are generally effective, although some may cause severe side effects, including nausea, diarrhea, cramps and vertigo. If you suspect intestinal parasites, it's a good idea to get a diagnosis from a physician and follow his or her advice concerning treatment. Then discuss these herbal remedies with your doctor. If you try a natural approach, you might be able to deal with the problem without the side effects caused by many pharmaceuticals.

*Ginger:* Common Spice and Wonder Drug, states that the tangy root is remarkably effective against some of the world's most dangerous parasites.

Among these is the anisakis worm, a Japanese worm that is carried in raw fish and is now increasingly common in the United States. No wonder the Japanese eat pickled ginger extract immobilized more than 90 percent of anisakis larvae within 4 hrs and destroyed them in 16 hrs.

If you're a big fan of sashimi, the Japanese raw-fish specialty, it probably wouldn't be a bad idea to adopt the Japanese custom of having some pickled ginger is available in Asian markets and many specialty food stores.

The same advice goes for eating ceviche, the Latin American dish made from marinated raw fish: Top off your meal with a piece of pickled ginger for a double whammy.

*Wormseed (Chenopodium ambrosioides).* Wormseed is not used as a dewormer only in the tropics. As a long-time resident of Maryland, I am proud to relate that wormseed was once produced commercially in my state's Carroll and Frederick counties for treatment of intestinal worms in American children and pets. I've also found that wormseed helps relieve gas, so I add it to bean soups. For worms, I'd try a concentrated tea. A word of caution: The concentrated wormseed oil is too potent to use.

You're far more likely to find this herb sold under the Spanish name epazote. Although wormseed is the correct English name, natural food stores tend to shy away from selling it under this name.

*Garlic* to treat pinworms, roundworms, giardia (an amoeba) and other parasitic infections. He suggests juicing three cloves with four to six ounces of carrot juice and taking it every two hours.

*Papaya (Carica papaya).* Here's another Panama-Peru connection: The Choco Indians that I studied more than three decades ago used to take the protein-digesting (proteolytic) latex of papaya to get rid of intestinal parasites. My new Peruvian Indian friends have gotten a mite more efficient and tidy: They swallow about a dozen of the pellet-size papaya seeds to accomplish the same end. I have chewed papaya seeds, and they are almost as hot as vitamin C, which helps build immunity, and hot-flavored seeds that help repel intestinal worms.



*Pineapple (Ananas comosus).* Tapeworms may clear up after three days of eating nothing but pineapple. Pineapple contains the protein-digesting enzyme Turmeric (*Curcuma longa*). Indian folk healers recommend this tasty spice for getting rid of worms, particularly nematodes. turmeric, as far as I'm concerned, is to enjoy curry dishes, in which it is a key ingredient. It is responsible for curries' yellow color.

*Clove tea or adding powdered cloves to pineapple or papaya juices.*

Finally, because proteolytic enzymes. These include breadfruit, figs, papaya and pineapple. Spice the beverage

to taste with cloves, turmeric. (Unless you live in the tropics, you probably won't be able to get the breadfruit. It's okay to leave it out.) You might also add a little prune juice as a laxative to help expel dislodged worms.

### **Black Walnut**

Black walnut is often used by pet owners as a natural de-worming agent, especially to treat heartworm disease. While the history of the herb supports its use to treat parasites, there is no consistent proof of its use as a single agent to treat heartworm infection. This herb is usually

considered too toxic to use without supervision. The tannins and alkaloids may lead to vomiting and diarrhea. Most conventional de-wormers (and other herbal de-worming preparations) are much safer.

#### ***German Chamomile***

Chamomile is well known for its sedative effects. Avoid in pregnant animals as it may cause abortion. Usually considered a safe herb, the rare pet or child may be allergic to chamomile.

#### ***Chaparral***

Chaparral is reported to be an effective antimicrobial herb. However, ingestion of large amounts can lead to liver damage; avoid with liver disease; potentially a very toxic herb and not usually recommended.

#### ***Red Clover***

Red clover is used in many herbal cancer formulas due to its diuretic, blood cleansing, and anti-neoplastic effects. Red clover contains coumadin and should not be used in pets with blood clotting disorders. If fed in large amounts, the estrogenic components can be toxic. Do not use in pregnant animals. Red clover contains very small amounts of salicylic acid (aspirin,) and care should be used in taking corticosteroids or non-steroidal medications and in cats or children which are sensitive to salicylic acid.

#### ***Comfrey***

Comfrey has been used for its anti-inflammatory and lubricating properties. Comfrey contains alkaloids that can cause liver damage or cancer. While the leaves (the most commonly used part of the herb) contain almost negligible amounts of alkaloids (the roots contain the most and should never be used,) many doctors consider it too toxic to use for any reason.

#### ***Echinacea***

Echinacea is a well-known immune modulating supplement. For immune system disorders (autoimmune diseases, diabetes) and disorders with diminished immune systems with low white blood cell counts (feline leukemia and immunodeficiency diseases,) it was recommended in the older literature to avoid this herb as Echinacea is used for immune stimulation. However, there have been no clinical studies supporting this recommendation, and Echinacea has been safely used in people with these disorders.

The older literature also recommended not using the herb for longer than 4-8 weeks without giving the body a "break," but again this has not been substantiated clinically and it has in fact been used for longer periods of time without harm. Most veterinarians prefer to use Echinacea early in the course of the disease at the first signs of infection to properly and fully modulate the immune system. Caution is warranted in diabetics as the condition may become unstable.

#### ***Ephedra***

Ephedra has a long history of use in Traditional Chinese Medicine as an effective therapy for respiratory (especially asthmatic) disorders. While it has been reported that cats may exhibit

idiosyncratic reactions, I have not had any side effects in cats treated with ephedra for upper respiratory disease. Ephedra, most commonly prescribed for pets with asthma or respiratory problems, can cause heart arrhythmias and high blood pressure. Use with great caution in all pets.

It should not be used when medications which have similar actions are used (MAO inhibitors, sympathomimetics) or in pets with hypertension, cardiac arrhythmias, anxiety, restlessness, glaucoma, cardiovascular disease, impaired cerebral circulation, prostatic adenoma, pheochromocytoma, or hyperthyroidism.

#### ***Garlic***

Garlic has been historically recommended for many uses, including the treatment of parasites, microbial infections, and in the treatment of cancer. Garlic in large amounts can cause Heinz body anemia in dogs and cats due to the presence of S-methyl cysteine sulfoxide and N-propylsulfide. Do not use in pets with anemia. Garlic in high doses can prolong bleeding times. As a general guideline, 1 clove of garlic per 10 pounds of body weight for dogs (and 1/2 clove per cat) can usually be fed safely each day if the pet is not anemic.

#### ***Ginkgo Biloba***

Ginkgo is well known for its use in treating mild forms of cognitive disorder and intermittent claudication in people. Ginkgo has antithrombotic activity via its PAF inhibition. Caution should be used if ginkgo is given to patients taking anticoagulant or antithrombotic medications (aspirin, NSAIDs.)

It has been suggested that anti-platelet medications and herbs be stopped about 1 week prior to surgery. Rare reports of spontaneous bleeding (subdural hematomas, hyphema, subarachnoid hemorrhage) are reported in the human literature, especially when combined with high doses of fish oil or other anti-clotting medications.. No reports are noted in pets. Do not use in animals with blood clotting disorders. Do not use in pregnant animals.

#### ***Kava kava***

Kava has a long traditional history of being a good calming, sedative herb. Can be toxic to the liver in excess amounts and it should not be used in pets with liver disease. There have been recent reports of liver toxicity and death in depressed people treated with this herb. However, careful analysis of these reports revealed that these patients had preexisting liver disease, were taking drugs with potential hepatotoxicity, or were suffering from chronic alcoholism.

The herb has a long history of safety but it is recommended to screen for liver disease before using the herb and to periodically monitor liver enzymes if the herb needs to be given for long-term use.

Do not use in pregnant animals. May interact with anxiolytic medications (Valium, etc.)

#### ***Milk Thistle***

Milk thistle is well-known for its treatment of liver disease. Do not use in pregnant animals. Long term use in normal animals may result in depressed liver function unless chronic liver disease is present. It is not recommended to use milk thistle to prevent liver disease.

### **Passionflower**

This herb is used for its sedative effects. Do not use in pregnant animals. Excessive doses may cause sedation and potentiate the effects of drugs that are monoamine oxidase (MAO) medications.

### **Pennyroyal**

While pennyroyal oil is an effective insecticide, due to potential severe toxicity and death pennyroyal oil is not recommended for use in pets.

### **Tea Tree**

Tea tree oil is used topically for its antimicrobial effects. It can also help itching and control external parasites like fleas. It is generally recommended not to use most volatile oils in cats, or only do so with proper dilution and supervision. Small-breed dogs may also be sensitive to undiluted oil. The safest way to use this product is to only purchase properly prepared and already diluted products.

### **Valerian**

This herb is used for its sedative effects. Do not use it in pregnant animals. It can cause gastrointestinal upset in large doses. Do not use with similar medications (barbiturates or benzodiazepenes like Valium) without medical supervision as increased sedation may occur.

### **Wormwood**

Like black walnut, this is another traditional de-worming herb. It is considered unsafe for internal use in people without careful supervision. Do not use in pets with seizures, kidney disease, liver disease, or in pregnant animals. Safer herbs for de-worming exist and wormwood should only be used once a year and then with extreme caution.

### **St. John's Wort**

This is used as a natural sedative. Some pets may develop sensitivity to sun exposure, although this is unlikely in dogs and cats when used at recommended dosages. It may interact with other similar medications. Serotonin syndrome may occur if combined with SSRI medications. St. John's Wort may interfere with the metabolism of medications administered with St. John's Wort."

### **Fatty Acids**

Both flax seed and fish oil are considered very safe when used at commonly recommended doses. High doses of fish oil have caused brain hemorrhages in some people when combined with other supplements or medications that interfere with blood clotting.

### **Joint Supplements**

Hyaluronic acid, glucosamine, and chondroitin are safe when used at recommended doses. They are very effective in controlling joint pain and are much safer than commonly prescribed NSAID medications

### **Vitamins and Minerals**

When given as combination animal (not people) products, most of these supplements should be

safe. Individual vitamins, especially when used in high doses, act like drugs and can be dangerous and should only be used under veterinary supervision.

### **Probiotics**

Probiotics are used to help pets with gastrointestinal problems and are safe when used as directed.

### **Enzymes**

Enzymes are among the safest supplements, although one of my own patients has experienced seizures as an idiosyncratic reaction to one particular product.

### **Green Foods**

These supplements, typical grasses like barley grass, wheat grass, algae, or spirulina are usually safe when used as directed." There are many many herbal remedies for parasite control. Here are some popular ones. Be careful and don't believe everything you read.

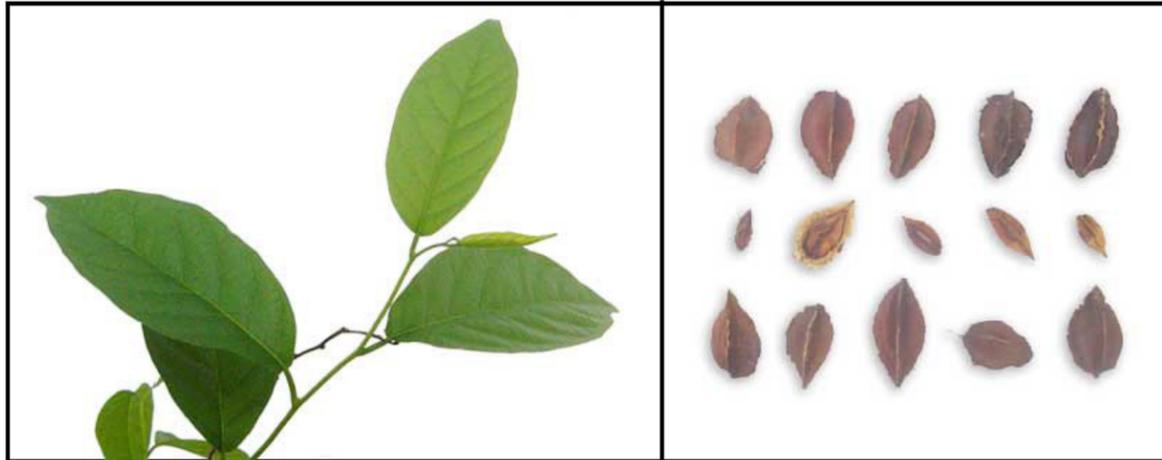
### **Niyog-niyogan**

Quisqualis indica

*Yesterday, today, and tomorrow*

Shih-chun-tzu

Other scientific names	Common names	
Q. densiflora	Balitadham (BIS.)	Tañgulo (Bik.)
Q. malabarica	Bawe-bawe (Pamp.)	Tartaraok (Bik., Ilk.)
Q. pubecens	Bonor (P. Bis.)	Tartarau (Iloko)
Q. spinosa	Kasumbal (Bik.)	Taungon (Manobo)
	Pinion (Bis.)	Tangolan (Tag.)
	Piñones (C. Bis., Spanish)	Tontoraok (Tag.)
	Tagarau (Tag.)	Burma Creeper (Engl.)
	Tagulo (Tag.)	Chinese honeysuckle (Engl.)
	Talulong; (Ibn.)	Liane Vermifuge (Engl.)
	Talulung (Ibn.)	Rangoon creeper (Engl.)
	Tanglon (Bik.)	Shih-chun-tzu (Chin.)
	Tangolo (Tag., Bik.)	Yesterday, today, and tomorrow (Engl.)



### Botany

Large climbing shrub. Leaves are oblong and opposite, rounded at the base. Flowers tubular and fragrant, white to purpish orange, in clusters on the same stalk. Narrow 5-angled dried fruit, resembling coconuts in taste.

### Graphic/photo

Fruits measuring 35-40 mm (upper and lower rows); seeds (middle row) shaped like the fruit-shell, measuring 12-15 mm.

### Distribution

Grows widely in thickets. The seeds are easily propagated.

### Parts utilized

Seeds (dried nuts) and leaves.

### Constituents

Fatty oil, 15%; gum; resin.

Studies yield quisqualic acid, quisqualin A.

Considered anthelmintic, antiinflammatory.

### Uses

#### Folkloric

- Anthelmintic: Dried seeds preferable for deworming.
- Adults: Dried nuts-chew 8 to 10 small- to medium-sized dried nuts two hours after a meal, as a single dose, followed by a half glass of water. If fresh nuts are used, chew only 4-5 nuts. Hiccups occur more frequently with the use of fresh nuts.
- Children 3-5 years old: 4-5 dried nuts; 6 - 8 years old: 5-6 dried nuts; 9-12 years old: 6-7 dried nuts.

**Caution:** Adverse reactions - diarrhea, abdominal pain, distention and hiccups more likely if nuts are eaten in consecutive days or when fresh nuts are eaten.

- Roasted seeds for diarrhea and fever.
- Pounded leaves externally for skin diseases.
- Decoction of boiled leaves used for dysuria.
- Ifugao migrants use it for headache.
- In Thailand, seeds used as anthelmintic; flowers for diarrhea.
- In Bangladesh, used for diarrhea, fever, boils, ulcers and helminthiasis.

### Studies

- Kinetics of Acetylcholinesterase Inhibition of *Quisqualis indica* Linn. Flower Extract: Flower extract yielded high polyphenol contents and showed a strong antioxidant activity. The QI extract inhibited acetylcholinesterase activity. Acetylcholine is an important nervous system neurotransmitter.

### 826-100ml - Green Walnut



**GREEN WALNUT** - Supplement for formula # 825 VermXpel, simply called 826 Green Walnut deworming booster. A triple-strength walnut formula which boosts the properties of formula #825 VermXpel in more chronic conditions.

Contains Green husk of black walnut, Aloe vera gel, carrageen sea herb, Paulowina leaf, Prickley ash berry, Cayenne pod, Vitamin E.

### GENERAL ADVICE

- Shake well 5 - 6 times up-ended to remix.
- *Initial Dosage:* Day 1 - 1/4 dose, Day 2 - 1/2 dose, Day 3 - full dose, swill before swallowing.
- *Coffee/Tea:* May be taken 1/2 hour before or after dose.
- *Preconception:* (whilst attempting) 1/4 to 1/2 dosage.
- *Pregnancy:* 1/4 to 1/2 dose daily up to 10 weeks.
- *Breastfeeding:* 1/4 to 1/2 dose 2-3 x daily.
- *Surgery:* (all) 1/4 dosage, 2-3 x daily, recuperating. Stop tonic doses 1 week prior to surgery.
- *Drugs:* Check drug/herb compatibility information sources prior to purchase. Take tonic 1/2 hour before drugs. Reduce tonic dose to 1/2 if on drug medication.

**This preparation is not a cure nor a substitute for orthodox medical attention and treatment.** Do not exceed stated dosages. Refrigeration not required. Keep out of reach of Children.



## Vitaklenz - Parasites & Worms Cleanse - Herbal Tablets

### Vitaklenz - The Natural Herbal Formula for Parasites & Worms

Vitaklenz is a blend of herbs traditionally used to control parasites. The double action of this powerful formula assists the elimination of parasites and candida infestation. It is one of the most powerful parasite cleansing treatments in the UK and has become one of our bestselling products.

**Parasite cleanse Vitaklenz contains only natural ingredients**

*Vitaklenz herbal tablets contains:* Cloves; Wormwood; Black Walnut Green Hulls Pumpkin Seed; Milk Thistle; Olive Leaf; Pau d'Arco; Gentian; Echinacea; Barberry; Garlic; Thyme - all natural ingredients to rid your body of parasites and worms. A 30 day treatment of Vitaklenz recommended Adults over 12 years: 3 tablets per day

### Parasites & Worms

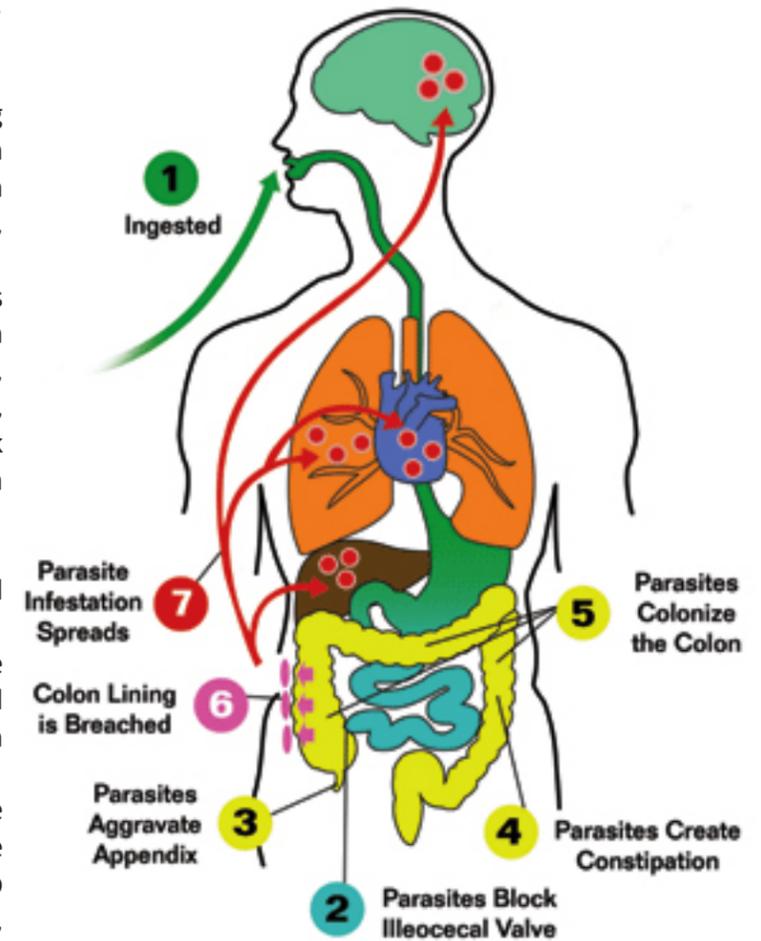
*Parasites can rob your system of nutrition, loading it down with the parasite's excretions and secretions. You probably don't even know they are there. Parasites can pose a serious health threat.* Parasitic worms may result in poor absorption of nutrients, and can contribute to fever, abdominal pain and anaemia. People with worm infections may feel bloated, tired, hungry, allergies, asthma, gas, digestive disorders, unclear thinking or feel toxic. Damage and symptoms will vary on the type of parasite infection. Some of the common ones are tapeworm, round worm, pin worm, hookworm, and the single cell parasites; amoebae, protozoa infections, neospora, Toxoplasmosis, cryptosporidium, giardia, Sarcocystis and Trichomonas vaginalis.

There can be over 100 different types of parasites worms living in human bodies. Some are microscopic in size while others can be seen quite easily. These common organisms can be found everywhere in our environment, in the air we breath, in the water we drink, or in the food we eat. Parasite is an organism that lives on or in other organisms from which it obtains nutrients to live and causes harm in the process. People with intestinal parasite infections are usually undernourished and weak, infected with viral, fungal, or bacteria, and have various types of chemical and metal poisoning. Human intestinal parasites can be present in any person, at any age. They are responsible for many health problems because they secrete toxins and steal the vital nutrients from our bodies. They can exaggerate other health problems you may be experiencing. Everyone is at risk and under their mercy during parasitic infections. The processed foods, drugs, cigarettes, alcohol, low hygiene can all contribute to parasitic invasion. Most parasites require a host to complete their life cycle. Animals can also serve as a host. The parasite will vary in size from the smallest one-thousandth of a micron to whale tapeworms a hundred feet long.

**Vitaklenz may help rid the body of parasitic and yeast infections common to man.** Vitaklenz herbal tablets contain Cloves, Wormwood, Black Walnut Green Hulls Pumpkin Seed, Milk Thistle, Olive Leaf, Pau d'Arco, Gentian, Echinacea, Barberry, Garlic & Thyme.

## Yearly Prevention of Worms + Other Parasites

1. Avoid exposure by not going barefoot, use light sandals, wash foods well, eat at reliable clean restaurants not street markets, but still exposure is likely
2. Spice is nice, these parasites hate strong spices, use on food not to excess. Ginger, mustard, cayenne, wormseed, wormwood, garlic, clove, black walnut, comfrey, green tea, tea tree oil.
3. SCIO anti-parasite therapy
4. Use teas of the herbs listed regularly
5. Papaya and pineapple have enzymes that can weaken and destroy parasites, use the fresh juice often
6. The skins of most fruits have anti-parasite effects, but the citrus have the most, grate up the skins of grapefruit, orange, lime, or their oil. Use as teas or to put into drinks or food.
7. Mexico and other countries have good OTC remedies use for one week once a year.
8. Once a year you and your family should do a parasite cleanse week, use teas 3x a day, juices 2x a day, extra ginger as a side dish.

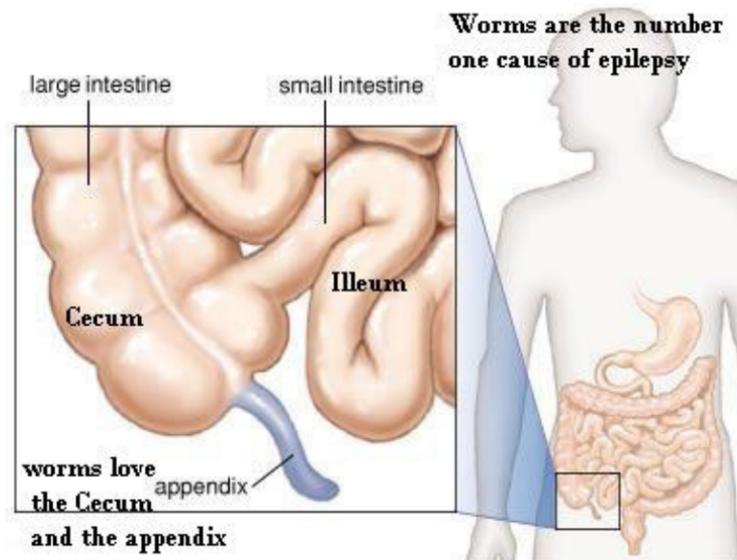
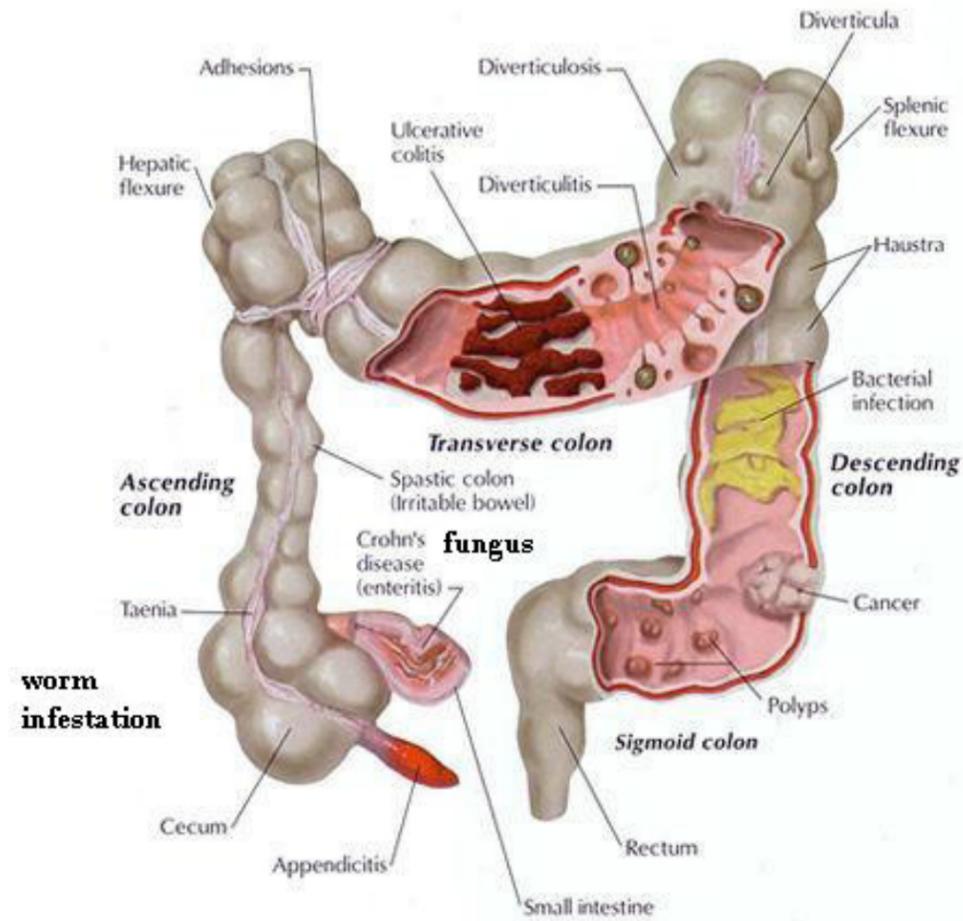


### Use the Desiré anti-parasite soup once a day for three days:

- chop up 3 onions, 3 tomatoes, 10 cloves of garlic; cloves; wormwood, black walnut, green hulls pumpkin seed; milk thistle; olive leaf; pau d'arco; gentian; echinacea; barberry; garlic, thyme, skins of citrus
- simmer at low temp for 3 hours
- lots of water, exercise, meditation, and enemas if there is no stool forthcoming

*Once a year will do most of us nicely.*

## Common Diseases of the Colon



## Top 5 Menu Items Most Likely to Contain Parasites

The parasitic life is all about finding niches in the ecosystem and exploiting them for all they're worth. And after billions of years mucking their way through blood vessels and intestines, you better believe they've gotten rather good at it. Untold billions are clamoring for a chance to get inside you -- and it just so happens that the best way to do that is to stow away in your next meal.

In this article, we're going to take a look at a few menu items with a high probability for parasites. By no means does this mean you're guaranteed a belly full of worms with each one! It's essential to stress that proper food storage, fresh ingredients and sanitary food preparation conditions vastly decrease the chances for food contamination.

So get ready to tuck in your napkin -- and for goodness sake wash your hands -- because we're about to take a close look at what's for dinner.



5. Escargot

If you happen to find the prospect of consuming cooked snails repulsive, then their parasites aren't going to concern you. However, if you're in the opposite camp and can't think of a better conveyance for tasty garlic butter, then you might want to sit down before reading this. Did you know that snails themselves sometimes dine on decaying leaves, fecal matter and carrion? For this reason, one of the first steps in preparing a snail for the dinner table is to clean out its digestive system. Snail farmers often avoid a lot of potential toxicity by raising their livestock on ground cereal.

Think back to that diet -- not the ground cereal, the other stuff. *Angiostrongylus cantonensis* or rat lungworm frequently set up house in snails and other mollusks thanks to their indiscriminate palates. And since snails are both bottom feeders and tasty treats, they're perfect for transmitting these parasites. Enjoy some undercooked escargot and *Angiostrongylus cantonensis* might wind up in your brain, resulting in sickness, headache and even meningitis. Additionally, a poorly washed food snail can bring a number of other disease risks straight to your table. To be fair, however, rat lungworm is common in a number of mollusks, including freshwater snails, slugs, shrimp and crabs. Frogs also play host. As always, the safest move is to err on the side of overcooking your creepy, crawly dinner choice.



#### 4. Sushi and sashimi

The world's oceans are teeming with delicious life forms. The problem is that many of those life forms are home to parasites. You can eliminate the risk of infection by simply cooking your seafood thoroughly. Alternately, you can freeze the fish for a week or cure it in saturated salt brine for five to seven days.

Sadly, each of these techniques can leave sushi enthusiasts in the lurch. The whole point to sushi, after all, is to appreciate the taste and texture of fresh, raw seafood. The two problem worms to consider before dining on uncooked fruit of the sea are

the Anisakidae nematode roundworms and the *Diphyllobothrium* tapeworm.

Of these, the roundworm is the most common. If ingested, you might not even notice it or suffer any symptoms. However, the worm can "tickle" your throat on the way down, and if it bores

into your stomach lining, it can cause severe abdominal inflammation and pain within an hour of ingestion. Luckily, these pesky parasites don't survive longer than 10 days in the human digestive track.

The *Diphyllobothrium* tapeworm is common in salmon, as well as other saltwater fish that also frequent fresh water. These freeloaders can thrive in the human gut for years, causing abdominal pain, weakness, weight loss and anemia. Luckily, they can be eradicated through medical treatment.

To avoid risking a mouthful of spicy nematode roll or tapeworm sashimi, stick to reputable restaurants that follow food safety guidelines. If you're still feeling a bit paranoid, ask whether the fish has been previously frozen or stick to the many sushi options that use cooked or vegetarian ingredients.

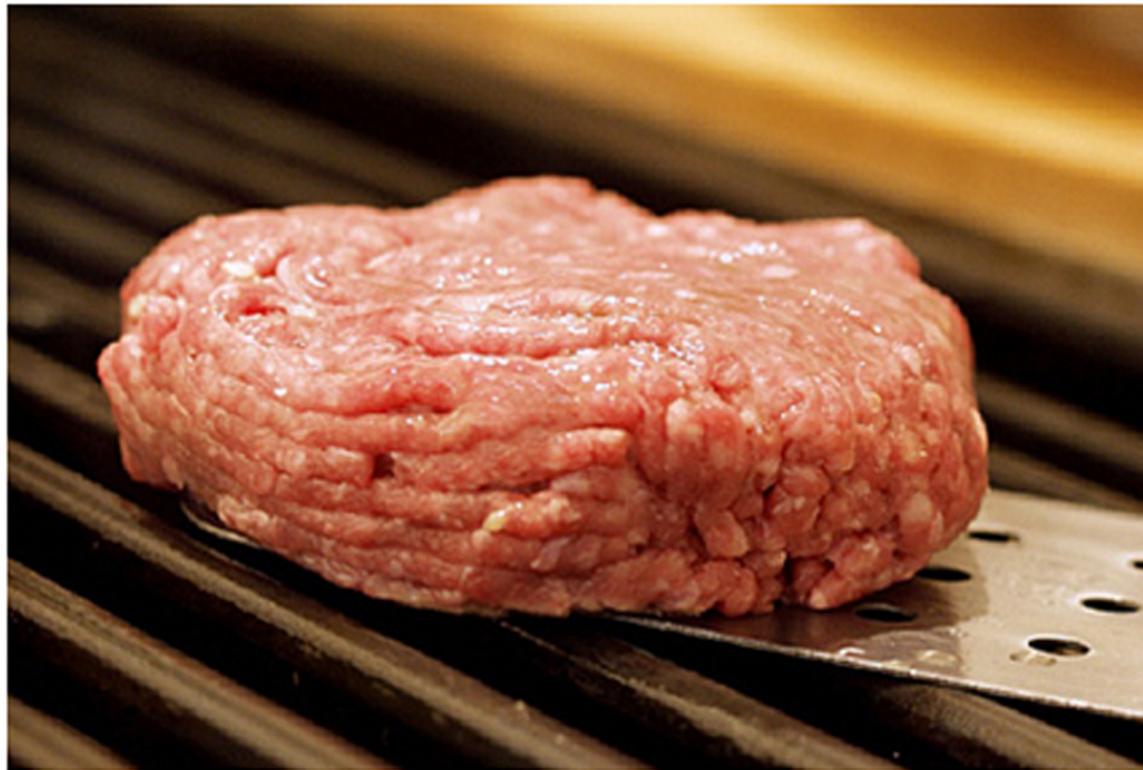


#### 3. Steak tartare

What's this, more raw meat? Do you see a pattern forming here? Naturally, steak or lamb tartare can offer an excellent risk for parasitic infection. Not only does the whole dish revolve around raw meat, but many recipes call for the addition of a raw egg as well. While a delectable treat in Asia, Eastern Europe and Ethiopia, all that raw meat serves up the risk for roundworms and the intracellular bacteria parasites salmonella, *E. coli* and *Listeria monocytogenes*.

The key here is to order tartare only from a reputable establishment. If you're going to eat it raw, you're going to want a very fresh, certified cut of meat and you're going to want it prepared in a hygienic environment. Some chefs put an emphasis on the use of grass-fed livestock, as the bacteria in grain-fed animals become acclimatized to an acidic environment, preparing them for

survival in the human gut. Also, freezing a cut of beef for 14 days should wipe out any parasitic risks. Steak and lamb tartare dishes (as well as other raw meats) remain a delicacy throughout the world and there's no reason to cease your enjoyment of them. Just exercise a little caution when choosing where you order it.



## 2. Pink hamburger

Granted, not all hamburgers are created equal. On one end of the spectrum, you have the discs of gray mystery meat grill-flipped by the hundreds at your local fast-food joint. On the other end, you have fancy gourmet burgers ground to order. Somewhere in between, summertime grill masters put the sizzle on some serious beef patties.

But if steak tartare is the classy method of consuming raw beef, then a rare, pink hamburger is generally considered the low-rent option for risking a bun full of *E. coli*, *Listeria monocytogenes* or salmonella. Undercooked hamburgers are a major risk factor for *E. coli*, with the number of outbreaks typically doubling during summer months.

Again, cleanliness and freshness are everything. While you might invite the prospect of a pink center in a \$30 gourmet burger, you should send that pinkish fast-food burger back. In addition, a 2008 study published in the *Annals of Diagnostic Pathology* examined the contents of eight fast-food hamburgers and discovered *Sarcocystis* parasites in two of them. Unlike other parasites that might be lurking in a pink hamburger, *Sarcocystis* is usually asymptomatic.



## 1. Ham and pork sandwiches

Interestingly enough, one of the more statistically risky menu items isn't even raw. The USDA, FDA and Centers for Disease Control and Prevention rank simple deli meat right at the top of their lists for *Listeria monocytogenes* infection. These meats often feature extended refrigerated storage times, during which *L. monocytogenes* has adequate time to thrive. The lesson here is to use fresh deli meat and only frequent sandwich shops that are going to do the same.

Pork poses a host of other parasitic risks as well if undercooked or poorly stored. Pork tapeworms pose a severe threat in that they sometimes spread to a host's eyes, spine or brain with potentially fatal results. A *Trichinella* worm infection offers a similar array of dire symptoms, ranging from nausea, diarrhea, vomiting, fatigue and fever to muscle pain, chills, heart problems and even death. So when considering that roadside barbecue purchase or vending machine ham sandwich, exercise a little caution. You might spare yourself a whole lot of parasites. Again, you can't beat cleanliness and fresh ingredients when choosing a restaurant. When all else fails, order it well done.



**Great Spirits get  
Incredible Resistance  
from Mediocre Minds**

**Small Petty Minds hate  
to see a Powerful Alive  
and Free Intellect.**

Small Minds often  
become bureaucrats  
so they can  
compensate for their  
insecurities.

They hate thinking big  
words like holistic,  
international, freedom  
the powers of the  
mind, the powers of  
the spirit.

These concepts scare  
them and they use  
every rationalization  
technique available to  
deny, twist, detract,  
divert, degrade, and  
discourage all from  
thinking big.

Their favorite  
technique is to shoot  
the messenger.

Desiré has proven the  
powers of the mind,  
the failure of synthetic  
drugs and many many  
more false beliefs.