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**Parasitic infections**

Three main categories of human parasitic infections are associated with skin and soft tissue diseases : **helminthic, protozoal,** and **ectoparasitic**.

**Helminths الديدان الطفيلية (Nematodes (roundworms), Cestodes (tapeworms), Trematodes (flukes).**

**Filariasis (Nematodes)**

* is a parasite that reside in the lymph nodes, lymphatic vessels, and subcutaneous tissues. This disease belongs to the group of diseases called  [**helminthiases**](https://en.wikipedia.org/wiki/Helminthiases)**.**
* Eight known filarial nematodes use humans as their definitive hosts. These are divided into **three groups according to the niche they occupy in the body:**

[**Lymphatic filariasis**](https://en.wikipedia.org/wiki/Lymphatic_filariasis) is caused by the worms

* [***Wuchereria bancrofti***](https://en.wikipedia.org/wiki/Wuchereria_bancrofti)
* [***Brugia malayi***](https://en.wikipedia.org/wiki/Brugia_malayi)
* [***Brugia timori***](https://en.wikipedia.org/wiki/Brugia_timori)**.**

These worms occupy the [lymphatic system](https://en.wikipedia.org/wiki/Lymphatic_system), including the lymph nodes; in chronic cases, these worms lead to the syndrome of  **Elephantiasis.**

**Subcutaneous filariasis** is caused by

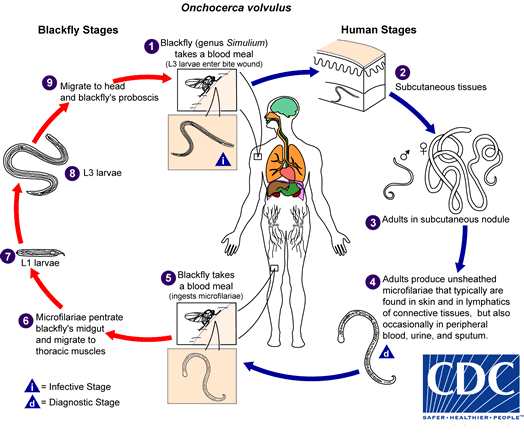
* [***Loa loa***](https://en.wikipedia.org/wiki/Loa_loa) (the eye worm), the causesof[***Loa loa* filariasis**](https://en.wikipedia.org/wiki/Loa_loa_filariasis)
* [***Mansonella streptocerca***](https://en.wikipedia.org/wiki/Mansonella_streptocerca)
* [***Onchocerca volvulus***](https://en.wikipedia.org/wiki/Onchocerca_volvulus). These worms occupy the [subcutaneous](https://en.wikipedia.org/wiki/Subcutaneous_tissue) layer of the skin, in the fat layer. Onchocerca is transmitted by **black flies** and causes **subcutaneous nodules** and “**River blindness”** because transmission is most often in rural villages near rapidly flowing streams.

**Serous cavity filariasis** is caused by the worms

* [***Mansonella perstans***](https://en.wikipedia.org/wiki/Mansonella_perstans)
* [***Mansonella ozzardi***](https://en.wikipedia.org/wiki/Mansonella_ozzardi)**, which occupy the**[**serous cavity**](https://en.wikipedia.org/wiki/Serous_membrane)**of the**[**abdomen**](https://en.wikipedia.org/wiki/Abdomen)
* [***Dirofilaria immitis***](https://en.wikipedia.org/wiki/Dirofilaria_immitis)**, or the dog heartworm rarely infects humans.**

**Onchocerciasis** (**chronic subcutaneous filariasis**) disease caused by ***Onchocerca volvulus****,* which is confined geographically to parts of West Africa, Mexico, Central and South America, and the Middle East.

* After being introduced into the body by **blackflies**, the larvae develop into adult worms in subcutaneous tissues, particularly over bony prominences **بروزات عظمية** in the head and shoulders, hips, and lower extremities.
* These subdermal nodules are known as **“ Onchocercomata**” .



* The worms shed thousands of microfilariae that migrate through the skin and have an affinity for the eye and leads to inflammatory response that causes visual disturbances and blindness.
* The migration of microfilariae through skin leads to an intensely **itchy rash and skin edema, depigmentation** **or thickening of the skin.**

**Onchocercomata”**

**Subdermal nodule**

* **Laboratory diagnosis** of the cutaneous disease can be made by superficial skin biopsies **skin snips** (A biopsy of the **skin** is done to identify larvae, which emerge from the **skin** when it is put in physiologic solutions). Serologic testing also used for filarial antigens. If present, cutaneous nodules can also be excised to confirm the presence of adult worms.

***Leishmania***

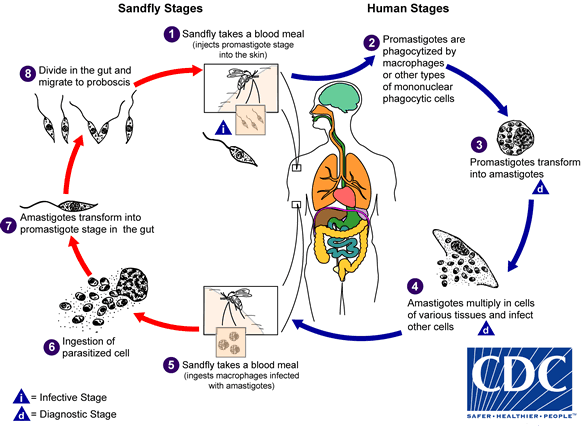
* The disease can present in three main ways:

1. **C**[**utaneous**](https://en.wikipedia.org/wiki/Cutaneous_leishmaniasis); presents with skin ulcers, the most common form, which causes an open sore at the bite sites, which heals in a few months to a year leaving an unpleasant-looking [scar](https://en.wikipedia.org/wiki/Scar)
2. **Mucocutaneou**s; presents with ulcers of the skin, mouth, and nose
3. [**Visceral leishmaniasis**](https://en.wikipedia.org/wiki/Visceral_leishmaniasis)**;** known as *kala-azar.* starts with skin ulcers and then later presents with fever, low red blood cells, and enlarged spleen and liver.

* *Leishmania* is maintained in mammal reservoirs (dogs, rodents, humans); and is transmitted by the bite of sandflies.
* Most *Leishmania* infections are limited to the skin and adjacent lymph nodes.
* Cutaneous leishmaniasis develops days to months after the bite of an infected sandfly and is characterized by a **painless papule that enlarges and may ulcerate**. It can be **complicated by scarring that is disfiguring and secondary infection**
* Some lesions remain smooth or become hyperkeratotic, and the appearance of the lesions can vary according to the infecting *Leishmania* species.

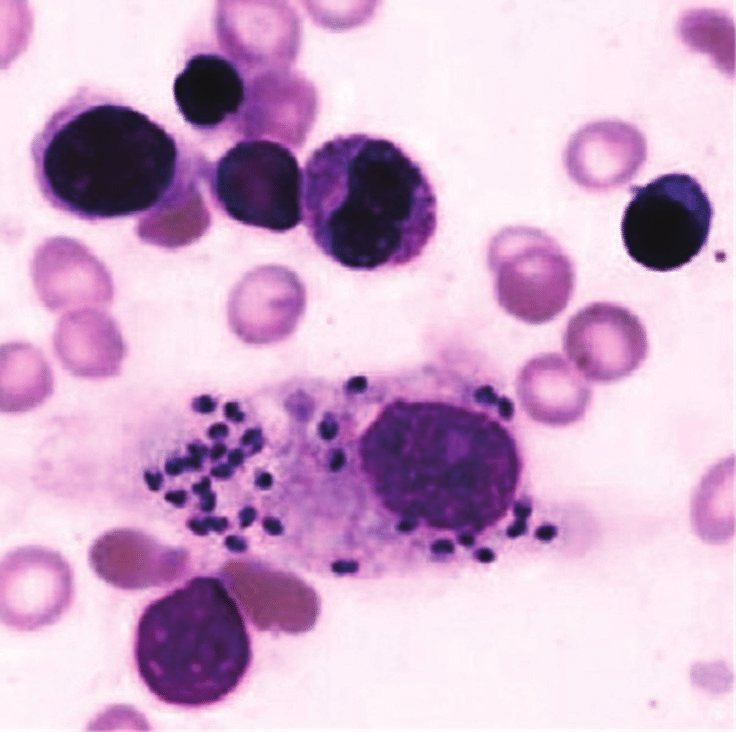
[](http://www.clinicaladvisor.com/dermatology/cutaneous-leishmaniasis/article/592752/) [](https://www.researchgate.net/figure/6455546_fig4_Fig-4-Hyperkeratotic-nodular-CL-lesions-and-leishmaniasis-recidivans-on-right-cheek)

* Local dissemination of infection can occur with the development of additional skin lesions or nodular lymphangitis pattern.
* **Hematogenous** dissemination might occur with widespread cutaneous lesions that are often associated with mucosal involvement.



**Diagnosis** is made by identifying Amastigotes in a scraping or biopsy of a skin lesion

* culture and/or PCR can also be performed on the tissue.
* Spontaneous cure of cutaneous lesions is typical over a period of months.



[**Skin smear staning with GS**](https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwjtt6q-1qLlAhUDZ1AKHeXfDOIQjhx6BAgBEAI&url=https%3A%2F%2Fwww.researchgate.net%2Ffigure%2FSkin-smear-showing-Leishman-Donovan-bodies-with-Giemsa-stain_fig2_315864958&psig=AOvVaw2si67vZxv4k9fP6QWZJJ_0&ust=1571380288354691)

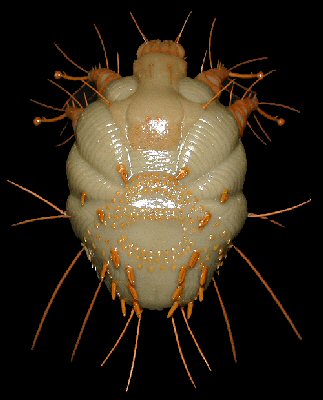
**Ectoparasites**

A number of ectoparasites may cause human infection, including lice (pediculosis التقمل), mites (scabies الجرب ), fleas, ticks, and bedbugs

* The mite of scabies attaches or burrow in the skin and can remain there for weeks to months.
* The dermatologies features of these infestations include **severe itching** and the **formation of papules, vesicles, nodules**, and **linear burrows**

[](https://en.wikipedia.org/wiki/Scabies)

***Sarcoptes scabiei****,* the mite that causes scabies, is too small to be seen by the naked eye. This mite burrows in the stratum corneum, laying eggs that hatch and mature.

[](http://www.mawarmelati.com.my/2016/08/alternatif-untuk-kudis-buta.html) [](http://blogkusutserabut.blogspot.com/2016/07/unpaid-review-ubat-scabies-rash-atau.html)

The rash frequently occurs in the genital region and in the webs between fingers.

[](https://www.healthline.com/health/scabies-bites)[](https://www.youtube.com/watch?v=Xm46eaDAQ9c)

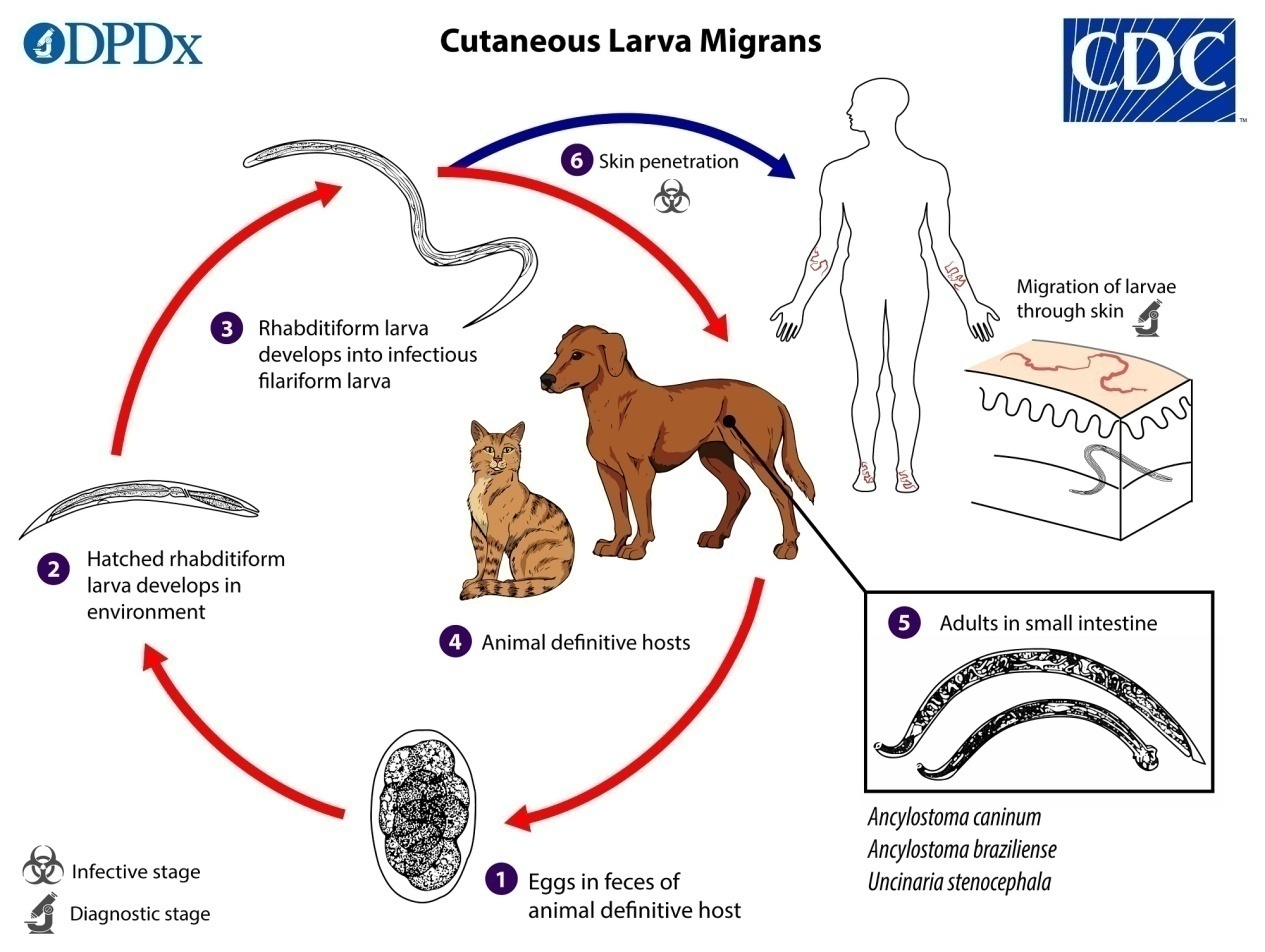
[](https://beta.nhs.uk/conditions/scabies/)[](https://www.healthline.com/health/scabies)

Norwegian scabies is a particularly severe infestation that occurs in immunocompromised individuals and causes a **psoriasis-type dermatitis**

Diagnosis: Scrapings of affected areas of skin with microscopy can confirm the diagnosis

[**Ancylostomiasis**](https://en.wikipedia.org/wiki/Ancylostomatidae) (**Cutaneous larva migrans)** (**CLM**) is a disease caused by an infection with hookworms. It means **"wandering larvae in the skin"**caused by the larvae that usually infest cats, dogs and other animals. It is an intestinal parasite of domestic [cats](https://en.wikipedia.org/wiki/Cat) and [dogs](https://en.wikipedia.org/wiki/Dog).

* Humans can be infected with the larvae by walking barefoot on sandy beaches or contacting moist soft soil that have been contaminated with animal faeces.
* It is also known as **creeping eruption** as once infected, the larvae migrate under the skin's surface and cause itchy red lines
* The most common [species](https://en.wikipedia.org/wiki/Species) causing this disease in the Americas is [***Ancylostoma braziliense***](https://en.wikipedia.org/wiki/Ancylostoma_braziliense)**.** These parasites live in the intestines of dogs, cats, and wild animals and should not be confused with other members of the hookworm family for which humans are definitive [hosts](https://en.wikipedia.org/wiki/Host_(biology)), namely ***[Ancylostoma duodenale](https://en.wikipedia.org/wiki/Ancylostoma_duodenale" \o "Ancylostoma duodenale)***and ***[Necator americanus](https://en.wikipedia.org/wiki/Necator_americanus" \o "Necator americanus)*.**
* the disease is also known as "[**Ground itch**](https://en.wikipedia.org/wiki/Ground_itch)" or (in some parts of the USA) "**sandworms**", as the larvae like to live in sandy soil.



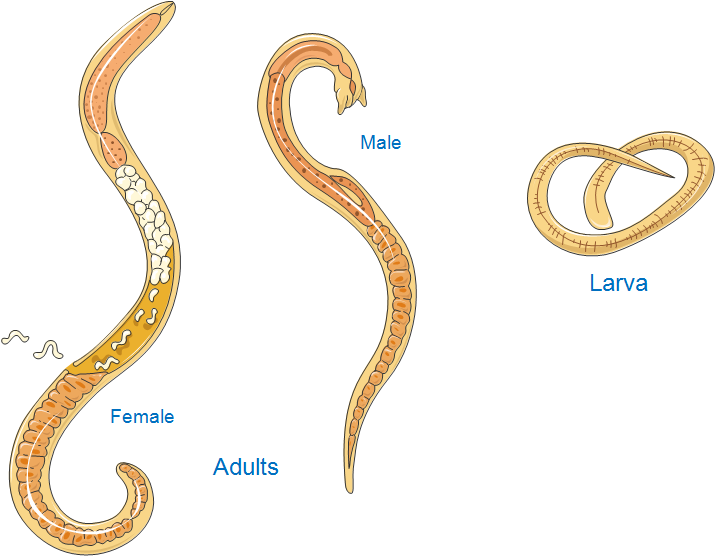
* The larvae are present in the [epidermis](https://en.wikipedia.org/wiki/Epidermis_(skin)), [hair follicles](https://en.wikipedia.org/wiki/Hair_follicles), and glands of the skin, sometimes extending to [sebaceous glands](https://en.wikipedia.org/wiki/Sebaceous_gland) where they form coils. A non-specific eruption occurs at the site of penetration of the hookworm larvae.
* The larvae can then either stay dormant for weeks or months or immediately begin creeping activity that create 2-3mm wide, snake-like tracks
* These are slightly raised, flesh-coloured or pink and cause intense itching.
* Sites most commonly affected by cutaneous larva migrans are the **feet, spaces between the toes, hands, and knees.**
* Then they migrate to the [heart](https://en.wikipedia.org/wiki/Heart) and [lung](https://en.wikipedia.org/wiki/Lung) by moving along the blood circulation. In the lungs, enter the [alveoli](https://en.wikipedia.org/wiki/Pulmonary_alveolus) and are propelled up the respiratory tract. From this, the host swallow them and deposit them in the small intestine. They become sexually mature

**Diagnosis**

* Diagnosis is usually clinical.
* Skin biopsy may show a larva in a burrow and inflammatory infiltrate.
* Optical coherence tomography can identify the larvae in the epidermis and allow direct removal.

[[](https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwjPssL-gJXlAhVCa1AKHcA6DOMQjRx6BAgBEAQ&url=https://www.flickr.com/photos/21908558@N02/3989713611&psig=AOvVaw0yxvMW0NWuS9XgoLhV1Wyd&ust=1570910109796342)](https://www.google.com/url?sa=i&source=images&cd=&ved=2ahUKEwjPssL-gJXlAhVCa1AKHcA6DOMQjRx6BAgBEAQ&url=https%3A%2F%2Fwww.flickr.com%2Fphotos%2F21908558%40N02%2F3989713611&psig=AOvVaw0yxvMW0NWuS9XgoLhV1Wyd&ust=1570910109796342" \t "_blank) [](http://emedicine.medscape.com/article/998709-overview)

**Trichinella spiralis (round worm)**



**Roundworm nematode**, occurring in rodents, pigs, bears, hyenas and humans, and is responsible for the disease **trichinosis مرض دودة الخنزير**. It is sometimes referred to as the "**pork worm**" due to it being typically encountered in undercooked pork products.

Animals can become infected with Trichinella when they feed on other infected animals or on garbage containing infected meat scraps.

Approximately 10,000 cases of trichinosis are diagnosed every year around the world (WHO).

**Trichinosis is caused** by eating raw or undercooked pork infected with the larvae of a parasitic worm.

These parasitic roundworms are found in animals that eat meat, such as: pigs, bears, foxes. Human acquiring disesse by eating raw or undercooked meat from an animal infected with *Trichinella* . The most common agent for humans is pork meat.

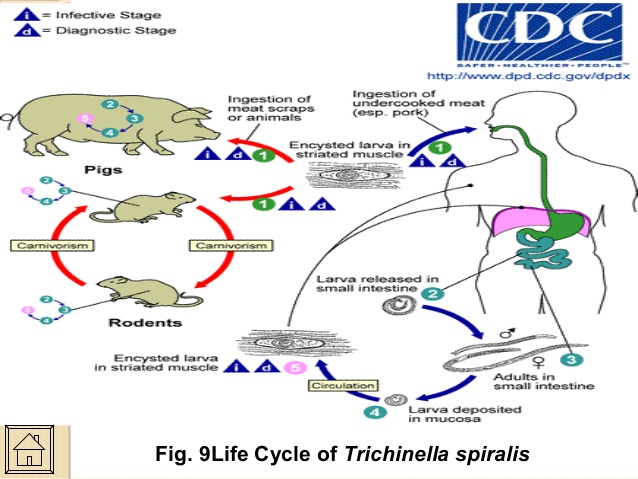
After the parasites are ingested, **the acid in the stomach dissolves the cyst**, which is the protective capsule surrounding the larvae. When the hard covering of the cyst is dissolved, **the larvae enter the intestine**, where they **mature into adult worms** and **reproduce**. The female worms then release their **larvae into the bloodstream**, allowing them to migrate through the blood vessels and into the **muscles.** Once they’re in the muscles, the worms **encapsulate into the muscle tissues**, where they can live for an extended period.

The **incubation period** ranges from 1-2 days (enteral phase) to 2 to 8 weeks (parenteral phase) or more, depending on the infectious dose and possibly the species of parasite.

**Symptoms that may occur after the larvae enter the muscle tissue include:**

* **muscle aches and pains**
* **a high fever**
* **facial swelling**
* **sensitivity to light and persistent eye infections**
* **unexplained rashes**
* **headaches**
* **chills**
* **inflammation of the whites of the eyes,**

**Trichinella** larvae bury themselves inside muscle tissue rather than remain in the intestine as in other roundworm infections, so stool sample tests don't often show evidence of the parasite.



**Diagnosis**  is relies on the exposure history, clinical diagnosis, and laboratory testing. There is no blood test that will look for the parasite. However, an increase in the number of eosinophils or the formation of antibodies against the parasite after several weeks considered significant

