

## Chapter 1 : Phlebotominae - Wikipedia

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**Characteristic Features** [1] **Eggs** Female Lutzomyia sand flies will typically lay small batches of around dark, elliptical eggs within a moist microhabitat. For most species, this will require the female to take a bloodmeal prior to oviposition. However, there are some species of the genus which are able to lay the first batch of eggs without a bloodmeal. **Larvae** Larval development of the Lutzomyia sand fly involves at least 18 days of development through four instars , before reaching maturity. Following hatching, the first instar larva will feed on any readily available organic matter. Development through the four instars produces a small, mature larva which is caterpillar-like in appearance. This larva will then aim to find a slightly drier environment in which to pupate. **Pupae** The pupal stage of development typically involves between 7 and 12 days of resting prior to emergence of the adults. It is generally the case that adult males emerge first. **Adults** Emergence of adult Lutzomyia sand flies occurs and, in males, is followed by sexual maturation within 24 hours. Adult males will then seek to mate, generally by using pheromones to find a resting site with potential mates. Males exhibit courtship behaviour , such as by varying wing beat patterns. **Feeding**[ edit ] Only the female Lutzomyia sand flies are blood-feeding, requiring the bloodmeal to provide the nutrients for the maturation of eggs. Therefore, it is only the females who have medical importance as vectors of disease. Both males and females require carbohydrate food as adults, the source of which remains unclear. These species are known as anthropophilic and tend to feed at around dusk. However, there are examples of anthropophilic species that will attack in the daytime. The majority of anthropophilic Lutzomyia species in the Americas are exophilic, which means that they favour biting outside of homes. For example, residual spraying of insecticides can be targeted at known resting sites to increase effectiveness. Lutzomyia sand flies generally rest outdoors, with the type of resting site varying between species and in response to the seasons and the availability of particular microhabitats. The largest resting microhabitat is the forest floor, but sand flies will also rest in a variety of other areas, such as in the nests and burrows of mammals , within the trunks of hollow trees and inside bat caves. Common reservoirs in the Americas include a number of rodent species, as well as dogs , sloths and armadillos. The human-sand fly-human cycle of transmission, known as anthroponotic , is limited to two Leishmania species endemic in the Old World and so does not involve Lutzomyia sand flies. The first stages of development are similar between all Leishmania species, with the sandfly taking up the amastigote form of the parasite following a bite of an infected host. However, unlike in the Old World , the replicated parasites then migrate to the hindgut of the Lutzomyia sand fly, a feature which is thought to be essential in allowing the parasite to become established. The high level of species diversity in the genus Lutzomyia, coupled with its high adaptability is leading to increasing risk of Leishmania transmission in the New World in response to global change. Lutzomyia sand flies transmit the disease in the tropics and subtropics, regions which are subject to high levels of deforestation associated with continual development. Deforestation, with the establishment of settlements at the periphery of primary or secondary forest , increases the risk of Leishmania transmission by creating a selection pressure for the adaptation of sand flies to these new peridomestic environments. Similar increases in risk factors are also driving higher rates of visceral leishmaniasis in north-eastern Brazil. Increased urbanisation , driven by climate change and socio-economic factors, is bringing the adapting sand flies into closer contact with both humans and the domestic canine reservoirs of the disease. The disease is transmitted by the sand fly species Lutzomyia verrucarum, as well as lice and fleas, and is found in areas of Peru , Colombia and Ecuador. The existence of bartonellosis transmission in areas not inhabited by Lutzomyia verrucarum suggests that secondary vectors, and potentially other Lutzomyia species, are important in the spread of the disease. One such virus of medical importance is the vesicular stomatitis virus VSV of the genus Vesiculovirus. Viruses of this genus are typically associated with flu-like symptoms, but have also been known to cause encephalitis. However, they are thought to be supported by both horizontal and transovarial

transmission in the sand fly.

**Chapter 2 : Lutzomyia shannoni - Wikipedia**

*Between and , approximately 15 Phlebotomine sandflies were collected in five limestone caves in Belize, Central America. Thirteen species of sandflies were identified, two of the genus Brumptomyia Fransa & Parrot and 11 of the genus Lutzomyia Fransa.*

**Lutzomyia shannoni** Dyar Insecta: Phlebotomine Introduction Back to Top Phlebotomine sand flies are of considerable public health importance because of their ability to transmit several viral, bacterial, and protozoal disease-causing organisms of humans and other animals. Confusion with other types of biting flies is often caused because the common name "sand fly" is also used for other biting flies of genera Ceratopogon and Culicoides. There are about species of phlebotomine sand flies of which about 70 are considered to transmit disease organisms to people Adler and Theodor Sand flies are characterized by their densely hairy wings, giving them a moth-like appearance. Phlebotomines are distinguished from other members of the family by the way they hold their wings erected above the body in a vertical "V", whereas members of other psychodid subfamilies hold their wings flat and near the body Azar and Nel **Lutzomyia shannoni** Dyar is a proven vector of vesicular stomatitis virus and a suspected vector of visceral leishmaniasis and sand fly fever in Florida. It is one of the more thoroughly studied species of phlebotomine sand flies in North America. Distribution Back to Top Sand flies occur in a wide range of habitats and individual species often have very specific habitat requirements. Its distribution is highly disjunct within the range, depending on locally occurring environmental factors such as frequency of precipitation, temperature, physical barriers, habitat availability, and the distribution and abundance of vertebrate hosts Young and Arias This species has been found as far north as Maryland and Delaware. **Lutzomyia shannoni** is associated with live oak *Quercus virginiana* Miller forests and to a lesser extent, mixed hardwood forests where an abundance of tree holes provides diurnal resting sites for adults. Three other species of Phlebotomine sand flies, **Lutzomyia cubensis** Fairchild and Hertig , **Lutzomyia vexator** Coquillett and **Lutzomyia cruciata** Coquillett are also known to occur in Florida Young and Perkins The eggs are elongated oval, dark brown in color with polygonal sculpturing over the chorion. The eggs are approximately 0. Eggs of **Lutzomyia shannoni** Dyar, a sand fly. Photograph by Jerry Butler , University of Florida. The body color is pale cream, while the head, caudal lobule and caudal setae are light brown. The body length measures between 0. The two caudal setae, just after eclosion, measure approximately twice the length of the body. The hypognathous head is well developed and measures between 0. The antennal tubercle is larger than the complete antenna. The first antennal segment is long and thin; the second is almost the same size in oval form, with a hair or arista Ferro et al. First instar larva of **Lutzomyia shannoni** Dyar, a sand fly. The color is similar to that of the first instar but it is larger in size, with four caudal setae approximately twice the body length Ferro et al. Third instar larvae are larger than the second instar, but color is similar to that of the first two instars. These larvae have four caudal setae and a Y-form dorsal suture on the head capsule Ferro et al. The caudal setae are approximately the same as the body length measuring between 2. Four well-defined stemmata and two setae with a round and prominent base are present on each side of the head and in the mandibles. The tergal plaque of the eighth abdominal segment and the caudal lobule are black in color. There are no locomotive organs on the thorax Ferro et al. Pupae are obtect, measuring approximately 2. They are glued to the substrate by the terminal abdominal segments consisting of the terminal pseudopodium of the ninth abdominal segment and the entire exuvium of the fourth instar larva Ferro et al. Pupa of **Lutzomyia shannoni** Dyar, a sand fly. Adults are small, silvery-brownish, long-legged flies with narrow bodies. The wings are less than 3 mm long, and are held erect above the body. They are nocturnally active insects with weak, direct flight capability, typically not dispersing more than a half kilometer Morrison et al. Adults shelter during the day in dark, humid places such as tree holes, animal burrows or under rocks. Sexual dimorphism is marked between the male and female flies. Males have conspicuous external terminalia with a relatively small and slender abdomen compared to the female. Mandibles are absent in males Young and Perkins Non blood-fed, adult female **Lutzomyia shannoni** Dyar, a sand fly. Blood-fed, adult female **Lutzomyia shannoni** Dyar, a sand fly. Adult male **Lutzomyia shannoni** Dyar,

a sand fly. Life Cycle Back to Top *Lutzomyia shannoni* is an holometabolous insect, progressing from egg to larva, pupa and adult. The complete life cycle can occur in 36 to 74 days depending upon the temperature and larval food quality. The average duration for the egg, larvae all instars , pupae and adult ranges between 6 to 13, 21 to 51, 7 to 32, and 4 to 15 days respectively Ferro et al. The eggs are laid dispersed singly in terrestrial microhabitats rich in organic matter that provides food for the larvae. The females require vertebrate blood for the maturation of the follicles. The first oviposition begins between four and eight days after blood ingestion. However, females from Florida are often autogenous Young and Perkins and can deposit up to 40 viable eggs without having previous blood meal. Both males and females obtain sugar meals by directly feeding on the tissues of plants and from the honey dew excreted by aphids and coccids. Males do not take a blood meal. Hosts Back to Top The males and females feed on nectar and other plant juices, but females require a blood meal in order to mature a second batch of eggs. The blood meal hosts include white-tailed deer, horses, donkeys, mules, cattle, swine, raccoons, rodents, birds and humans Young and Perkins , Comer et al. Medical Importance Back to Top At least 60 species in the Old World genus *Phlebotomus* or New World genus *Lutzomyia* are vectors of several vertebrate pathogens, including a group of parasitic flagellate protozoa, *Leishmania* spp. *Lutzomyia shannoni* feeds on mammals, including humans, and has been reported to transmit a visceral leishmaniasis in dogs, hamsters, and other mammals. This pathogen can also be transmitted to humans through contact with the organism, though human infection acquired as a result of direct exposure to an infected dog has never been reported Lawyer and Young , Travi et al. Visceral leishmaniasis had not been considered established in North America, however, recent events indicated that it does occur in foxhounds and perhaps certain other breeds of dogs. These foxhounds appear to have been infected with a strain of the parasite that originated in southern Europe. The Spinone dog breed is at risk of the infection because many dogs of this breed have been directly imported from Italy where the infection is present. Transmission through *Lutzomyia shannoni* has not been confirmed in North America and it is suspected that the infection is transmitted from dog to dog in blood and secretions incidental to biting, licking, breeding, blood transfusion, etc. The signs of leishmaniasis in dogs are variable and often do not appear until many months after exposure to the infection. The infected dog may lose weight and develop swollen lymph nodes or anemia. Skin lesions are common including hair loss and ulcers. The dog may lose appetite, become lethargic and bleed from the nose. Medical treatments can improve condition and prolong survival, but rarely eradicate the infection. Without treatment most infected dogs ultimately die Schantz In humans, signs and symptoms include fever, weight loss, anaemia and substantial swelling of the liver and spleen Rey Vesicular stomatitis is an acute viral vesicular disease of cattle, horses, deer and pigs and occasionally humans causing fever 24 to 48 hours after infection, vesicular lesions on mouth, coronary bands, and teats. Rupture of the oral vesicles leads to pain, excessive salivation and inappetance. The coronary band lesions lead to lameness. VSV infection resembles foot-and-mouth disease when it occurs in cattle and the other viral vesicular diseases when it occurs in pigs. VSV causes flu-like symptoms less commonly, oral vesicles and cervical lymphadenopathy in humans. Humans can become infected with VSV when handling infected animals if proper biosafety procedures are not followed. Prevalence of this disease in humans may be under-reported because it may often go undetected or may be misdiagnosed Nebraska Department of Agriculture Spraying of residual insecticides on surfaces in the home has been the primary method for control of sand flies but is obviously ineffective for those species which bite away from residences. This control technique has also been used for killing *Anopheles* mosquitoes that transmit malaria and in some regions is effective in reducing both malaria and leishmaniasis Alexander and Maroli Certain species of mammals are important reservoirs of *Leishmania* and by eliminating the reservoir species living near human habitation, disease rates can sometimes be decreased. For instance, rodenticides have been used against the great gerbil, *Rhombomys opimus*, in Central Asia. Insecticide spraying of larval habitat is usually normally not possible because very little is known about where the larvae occur Ashford Adler S, Theodor O. Transmission of disease agents by phlebotomine sand flies. Annual Review of Entomology 2: Alexander B, Maroli M. Control of phlebotomine sandflies. Medical and Veterinary Entomology Clinics in Dermatology 3: Azar D, Nel A. Fossil psychodoid flies and their relation to parasitic diseases. Hosts of *Lutzomyia shannoni* Diptera: Psychodidae in relation to vesicular stomatitis virus on

Ossabaw Island, Georgia, U. Medical and Veterinary Entomology 8: Emerging Infectious Diseases  
Bloodsucking Insects and Filth-breeding Flies. Life cycle and fecundity analysis of *Lutzomyia shannoni* Dyar  
Diptera: In Medical Insects and Arachnids eds. Chapman and Hall, London, pp. Experimental transmission of  
*Leishmania mexicana* to hamsters by bites of phlebotomine sand flies Diptera:

**Chapter 3 : a sand fly - *Lutzomyia shannoni* Dyar**

*Phlebotomine Sandflies in the Americas: \$ Latin America and the Caribbean / \$ Elsewhere Out of print This book is now calendrierdelascience.com find this book.*

Adult male *Lutzomyia shannoni* Dyar, a sand fly. The complete life cycle can occur in 36 to 74 days depending upon the temperature and larval food quality. The average duration for the egg, larvae all instars, pupae and adult ranges between 6 to 13, 21 to 51, 7 to 32, and 4 to 15 days respectively Ferro et al. The eggs are laid dispersed singly in terrestrial microhabitats rich in organic matter that provides food for the larvae. The females require vertebrate blood for the maturation of the follicles. The first oviposition begins between four and eight days after blood ingestion. However, females from Florida are often autogenous Young and Perkins and can deposit up to 40 viable eggs without having previous blood meal. Both males and females obtain sugar meals by directly feeding on the tissues of plants and from the honey dew excreted by aphids and coccids. Males do not take a blood meal. Hosts The males and females feed on nectar and other plant juices, but females require a blood meal in order to mature a second batch of eggs. The blood meal hosts include white-tailed deer, horses, donkeys, mules, cattle, swine, raccoons, rodents, birds, and humans Young and Perkins ; Comer et al. Medical Importance At least 60 species in the Old World genus *Phlebotomus* or New World genus *Lutzomyia* are vectors of several vertebrate pathogens, including a group of parasitic flagellate protozoa, *Leishmania* spp. Laboratory studies indicate that at least three species of *Leishmania* parasites, *Leishmania mexicana* Biagi, L. *Lutzomyia shannoni* feeds on mammals, including humans, and has been reported to transmit a visceral leishmaniasis in dogs, hamsters, and other mammals. This pathogen can also be transmitted to humans through contact with the organism, though human infection acquired as a result of direct exposure to an infected dog has never been reported Lawyer and Young ; Travi et al. Visceral leishmaniasis had not been considered established in North America, however, recent events indicated that it does occur in foxhounds and perhaps certain other breeds of dogs. These foxhounds appear to have been infected with a strain of the parasite that originated in southern Europe. The Spinone dog breed is at risk of the infection because many dogs of this breed have been directly imported from Italy where the infection is present. The signs of leishmaniasis in dogs are variable and often do not appear until many months after exposure to the infection. The infected dog may lose weight and develop swollen lymph nodes or anemia. Skin lesions are common including hair loss and ulcers. The dog may lose appetite, become lethargic and bleed from the nose. Medical treatments can improve condition and prolong survival, but rarely eradicate the infection. Without treatment most infected dogs ultimately die Schantz In humans, signs and symptoms include fever, weight loss, anaemia and substantial swelling of the liver and spleen Rey Vesicular stomatitis is an acute viral vesicular disease of cattle, horses, deer and pigs and occasionally humans causing fever 24 to 48 hours after infection, vesicular lesions on mouth, coronary bands, and teats. Rupture of the oral vesicles leads to pain, excessive salivation and inappetance. The coronary band lesions lead to lameness. VSV infection resembles foot-and-mouth disease when it occurs in cattle and the other viral vesicular diseases when it occurs in pigs. VSV causes flu-like symptoms less commonly, oral vesicles and cervical lymphadenopathy in humans. Humans can become infected with VSV when handling infected animals if proper biosafety procedures are not followed. Prevalence of this disease in humans may be under-reported because it may often go undetected or may be misdiagnosed Nebraska Department of Agriculture Spraying of residual insecticides on surfaces in the home has been the primary method for control of sand flies but is obviously ineffective for those species which bite away from residences. This control technique has also been used for killing *Anopheles* mosquitoes that transmit malaria and in some regions is effective in reducing both malaria and leishmaniasis Alexander and Maroli Certain species of mammals are important reservoirs of *Leishmania* and by eliminating the reservoir species living near human habitation, disease rates can sometimes be decreased. For instance, rodenticides have been used against the great gerbil, *Rhombomys opimus*, in Central Asia. Insecticide spraying of larval habitat is usually normally not possible because very little is known about where the larvae occur Ashford Transmission of disease agents by phlebotomine sand flies. Annual Review of

Entomology 2: Alexander B, Maroli M. Control of phlebotomine sandflies. Medical and Veterinary Entomology Clinics in Dermatology 3: Azar D, Nel A. Fossil psychodoid flies and their relation to parasitic diseases. Hosts of *Lutzomyia shannoni* Diptera: Psychodidae in relation to vesicular stomatitis virus on Ossabaw Island, Georgia, U. Medical and Veterinary Entomology 8: Emerging Infectious Diseases Bloodsucking Insects and Filth-breeding Flies. Life cycle and fecundity analysis of *Lutzomyia shannoni* Dyar Diptera: In Medical Insects and Arachnids eds. Chapman and Hall, London, pp. Experimental transmission of *Leishmania mexicana* to hamsters by bites of phlebotomine sand flies Diptera: Psychodidae from the United States. Journal of Medical Entomology Dispersal of the sand fly *Lutzomyia longipalpis* Diptera: Psychodidae at an endemic focus of visceral leishmaniasis in Colombia. Visceral leishmaniasis in dogs. Spinone Club of America. The truth is out there. Annals of the New York Academy of Sciences Research in Veterinary Science Phlebotomine sand flies of North America Diptera: Original publication date February Visit the EDIS website at <http://> This document is also available on the Featured Creatures website at <http://> Mann, postdoctoral research associate; Philip E. Kaufman, assistant professor; and Jerry F. The Institute of Food and Agricultural Sciences IFAS is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations.

**Chapter 4 : WHO | Leishmaniasis, sandfly fever and phlebotomine sandflies in Greece**

*Phlebotomine sand flies are of considerable public health importance because of their ability to transmit several viral, bacterial, and protozoal disease-causing organisms of humans and other animals. Confusion with other types of biting flies is often caused because the common name "sand fly" is.*

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**Chapter 5 : Leishmaniasis - Wikipedia**

*Bull. ent. Res.* 65, Published The Phlebotomine sandflies (Diptera, Psychodidae) of caves in Belize, Central America  
PAUL WILLIAMS \*

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. This article has been cited by other articles in PMC. Abstract Hoover Puggedo light traps were modified for use with green and blue-light-emitting diodes to trap phlebotomine sandflies in northeastern Brazil. A total of 2, specimens belonging to eight genera and 15 species were sampled. The predominant species were *Nyssomyia whitmani*. The green LED trap prevailed over the blue and control lights; however, no statistically significant difference could be detected among the three light sources. Even without statistical significance, we suggest using LEDs as an attractant for the capture of sandflies because of several advantages over the conventional method with incandescent lamps. The bite of the blood-feeding females is responsible for the transmission of several pathogens among vertebrate hosts, e. Approximately 56 species of New World America phlebotomine sandflies are involved in the transmission of *Leishmania* species Maroli et al. Phlebotomine vector control is a very important component of many antileishmaniasis programs Alexander Sandflies are diurnally resting, crepuscular or nocturnally active species. Adults are attracted to artificial light sources, which has led to the widespread use of visible light-based traps for monitoring and mass trapping sandfly species. The Centers for Disease Control CDC miniature light traps have long been recognised as the most effective and widely used battery-operated traps for sampling medically important insects, including phlebotomine sandflies, in surveillance studies Faiman et al. CDC light trap methods have become more effective over time, such as with the use of attractant-baited and light-emitting diode LED light traps Mann et al. LEDs with various wavelengths as excitation sources for attracting insects have recently been employed using modified light traps Bishop et al. There are some advantages, such as cheaper cost, difficulty to shatter, great durability and rare need of replacement, to the general use of LEDs as substitutes for the usual incandescent light sources. The use of LEDs to attract insects of medical importance has recently been reported, e. To the best of our knowledge, no comparative research has been carried out in Brazil on the effectiveness of LEDs as substitutes for incandescent lamps in the sandfly collection. This study was therefore conducted to determine the response of some Brazilian sandfly species to LEDs compared to incandescent lamps as an effective low-cost strategy for improving insect trapping efficiency. The two areas were 10 Km from each other. In the region, the climate is tropical and semihumid, with a well-defined wet season between January-June, followed by a drought period until the next rains. Sandflies were sampled from In the present study, the only modification was the replacement of the incandescent light bulbs by LEDs 1 LED for each trap. These colours were chosen from a set of six that were tested in a previous pilot study data not shown as the most attractive light sources for sandflies. An incandescent bulb mA, 3 V was used as a control. Light traps were set 1. The trap placement was randomised before each collecting day. Sandflies were processed and identified to the species level according to Galati The specimens of *Micropygomyia echinatopharynx* were identified according to Andrade Filho et al. Data were log transformed prior to analyses to achieve a more symmetric distribution. A total of 2, specimens belonging to eight genera and 15 species were sampled using the three light traps Table. The predominant species was N. The others accounted for 6.

**Chapter 6 : EENY /IN A Sand Fly, *Lutzomyia shannoni* Dyar (Insecta: Diptera: Psychodidae: Phlebotomine**

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Leishmaniasis is caused by the protozoan *Leishmania* parasites which are transmitted by the bite of infected female phlebotomine sandflies. The disease affects some of the poorest people on earth, and is associated with malnutrition, population displacement, poor housing, a weak immune system and lack of financial resources. Leishmaniasis is linked to environmental changes such as deforestation, building of dams, irrigation schemes, and urbanization. An estimated to 1 million new cases and 20 to 30 deaths occur annually. Only a small fraction of those infected by *Leishmania* parasites will eventually develop the disease. There are 3 main forms of the disease: It is characterized by irregular bouts of fever, weight loss, enlargement of the spleen and liver, and anaemia. An estimated 50 to 90 new cases of VL occur worldwide each year. In over two thirds of new CL cases occurred in 6 countries: It is estimated that between to 1 million new cases occur worldwide annually. The epidemiology of leishmaniasis depends on the characteristics of the parasite species, the local ecological characteristics of the transmission sites, current and past exposure of the human population to the parasite, and human behaviour. In East Africa, outbreaks of visceral leishmaniasis occur frequently. Visceral leishmaniasis is highly endemic in Iraq, Somalia and Sudan. There are also imported cases mainly from Africa and the Americas. WHO South-East Asia Region Visceral leishmaniasis is the main form of the disease in this region, also endemic for cutaneous leishmaniasis. The region is the only one with a regional initiative to eliminate visceral leishmaniasis as a public health problem. Post-kala-azar dermal leishmaniasis PKDL Post-kala-azar dermal leishmaniasis PKDL is usually a sequel of visceral leishmaniasis that appears as macular, papular or nodular rash usually on face, upper arms, trunks and other parts of the body. It usually appears 6 months to 1 or more years after kala-azar has apparently been cured, but can occur earlier. People with PKDL are considered to be a potential source of kala-azar infection. *Leishmania*-HIV co-infection *Leishmania*-HIV coinfecting people have high chance of developing the full-blown clinical disease, and high relapse and mortality rates. Antiretroviral treatment reduces the development of the disease, delays relapses and increases the survival of the coinfecting patients. Major risk factors Socioeconomic conditions Poverty increases the risk for leishmaniasis. Poor housing and domestic sanitary conditions such as a lack of waste management or open sewerage may increase sandfly breeding and resting sites, as well as their access to humans. Sandflies are attracted to crowded housing as these provide a good source of blood-meals. Human behaviour, such as sleeping outside or on the ground, may increase risk. Malnutrition Diets lacking protein-energy, iron, vitamin A and zinc increase the risk that an infection will progress to kala-azar. Population mobility Epidemics of both cutaneous and visceral leishmaniasis are often associated with migration and the movement of non-immune people into areas with existing transmission cycles. Occupational exposure as well as widespread deforestation remain important factors. Environmental changes The incidence of leishmaniasis can be affected by changes in urbanization, and the human incursion into forested areas. Climate change Leishmaniasis is climate-sensitive. Diagnosis and treatment In visceral leishmaniasis, diagnosis is made by combining clinical signs with parasitological, or serological tests such as rapid diagnostic tests. The treatment of leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographic location. Leishmaniasis is a treatable and curable disease, which requires an immunocompetent system because medicines will not get rid of the parasite from the body, thus the risk of relapse if immunosuppression occurs. All patients diagnosed as with visceral leishmaniasis require prompt and complete treatment. Detailed information on treatment of the various forms of the disease by geographic location is available in the WHO technical report series , "Control of leishmaniasis". Prevention and control Prevention and control of leishmaniasis requires a combination of intervention strategies because transmission occurs in a complex biological system involving the human host, parasite, sandfly vector and in some causes an animal reservoir host. Key strategies for prevention are listed below: Early detection and prompt treatment of cases help to reduce transmission and to monitor the spread and burden of disease.

Currently there are highly effective and safe anti-leishmanial medicines particularly for visceral leishmaniasis. Access to these medicines has significantly improved thanks to a WHO-negotiated price scheme and a medicine donation programme through WHO. Control methods include insecticide spray, use of insecticide-treated nets, environmental management and personal protection. Partnership and collaboration with various stakeholders and other vector-borne disease control programmes is critical. Supporting national leishmaniasis control programmes technically and financially to produce updated guidelines and make disease control plans, including sustainable, effective surveillance systems, and epidemic preparedness and response systems. Monitoring disease trends and assessing the impact of control activities which will allow raising awareness and advocacy on the global burden of leishmaniasis, and promoting equitable access to health services. Developing evidence-based policy guidelines, strategies and standards for leishmaniasis prevention and control, and monitoring their implementation. Strengthening collaboration and coordination among partners, stakeholders and other bodies. Promoting research and use of effective leishmaniasis control including safe, effective and affordable medicines, as well as diagnostic tools and vaccines.

### Chapter 7 : X-CART. Powerful PHP shopping cart software - Phlebotomine Sandflies in the Americas

*The best way to describe leishmaniasis, sandfly fever and phlebotomine sandflies is to call them an esoteric subject which has attracted the attention of investigators with an eye for difficult, unusual and challenging tasks. Although the parasites causing leishmaniasis were first discovered in*

### Chapter 8 : Lutzomyia - Wikipedia

*Phlebotomine sand flies are the vectors for leishmaniasis as well as for arboviruses and bartonellosis (Arias et al. ; Young and Duncan ). Visceral and cutaneous leishmaniasis are endemic in Brazil, and the numbers of cases are increasing.*

### Chapter 9 : Arias, Jorge R. [WorldCat Identities]

*Lutzomyia is a genus of phlebotomine sand flies consisting of nearly species, at least 33 of which have medical importance as vectors of human disease. Species of the genus Lutzomyia are found only in the New World, distributed in southern areas of the Nearctic and throughout the Neotropic zone.*