Wherever we live or travel, insects accompany us. Arthropods, the group that contains insects and other “hard shelled critters with legs” are known to be one of the most evolutionarily successful groups of animals in the world. They are literally everywhere. So, we have learned to live, as best we can, with these “bugs”. Many insects are beneficial, while others can be a nuisance, or worse yet, transmit diseases to humans.

It is not unusual, even expected, that when traveling in foreign environments, we may encounter “bugs.” This booklet has been prepared to help you identify, avoid, and understand more about some common “bugs” that you may encounter in your study abroad. In all cases, these are “bugs” that bite. Some of these insects you are probably already familiar with because they occur at home as well. Others you maybe have heard about, but never encountered or have misconceptions about them.

In most cases, simple measures can be taken to reduce or eliminate encounters with these “bugs.” In other cases, you may have to bring to the attention of your group leader or on-site personnel to have the proper identification and extermination of the insects that are causing concern.

So, keep this booklet with you as you travel as a guide in case you encounter “Travel Bugs.”
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Mosquitoes are blood-sucking insects that are responsible for the transmission of many diseases throughout the human and animal populations of the world. Several important human diseases are transmitted throughout Australia by these insects. In addition to being disease vectors, mosquitoes can cause major disruptions, through their persistent biting, to occupational, recreational and social activities.

Mosquitoes are small fragile insects that have six delicate legs and two wings covered in scales. The head of a mosquito is equipped with a projecting proboscis, which conceals and protects the long piercing and sucking mouthparts. These biting insects have a complex life cycle; the immature stage is totally aquatic and the adult is terrestrial. The adult female returns to a water habitat for a brief period to lay each batch of eggs. Mosquito species vary in their breeding habits, biting behavior, host preferences and flight range.

Within their lifetime both adult male and female will feed on nectar and plant fluids, but it is only the female that will seek a blood meal. The majority of species require this blood
meal as a protein source for egg development. Female mosquitoes are attracted to a potential host through a combination of different stimuli that emanate from the host. The stimuli can include carbon dioxide, body odors, air movement or heat. Upon locating a suitable host, the female will probe the skin for a blood capillary then inject a small amount of saliva containing chemicals which prevent the host's blood from clotting. This is often the pathway for potential pathogens such as viruses to enter a host. After engorging on the host's blood the female will find a resting place to digest her meal and develop eggs before flying off to deposit them in a suitable aquatic habitat.

**Mosquito-borne diseases**

Diseases transmitted by mosquitoes include Dengue fever, encephalitis and malaria.

**Clinical Presentation**

Sensitivity to mosquito bites varies with individuals, most people have only a mild reaction but others can have severe symptoms from the saliva of mosquitoes. Typical symptoms include swelling, redness and irritation at the puncture site. If the bites are scratched or traumatized, they may become infected with bacteria and a secondary infection can be initiated, especially on the lower limbs. Local symptoms can be relieved by application of antiseptic lotion or cream or by taking a mild antihistamine. The diagnosis of mosquito-borne diseases and can only be confirmed with appropriate blood tests.

**Laboratory Diagnosis**

Mosquitoes are identified with the aid of a stereo microscope and taxonomic keys. The detection of viruses and other pathogens in mosquitoes is undertaken.

**Treatment and Control**

Simple measures can be taken to limit contact with mosquitoes. Areas that are known to be infested with large numbers of mosquitoes should be avoided. Activities that are scheduled for outdoors, especially around dusk should be limited, as the biting activity of many mosquitoes will peak during this period. Clothing that has long sleeves and long pants should be worn when visiting areas that are infested with mosquitoes. A chemical repellent that contains approx 20% DEET (diethyl toluamide) should be used on exposed areas of skin, but not repeatedly on young children. Windows and doors should be screened.

Bed nets are an effective barrier against biting insects at home or camping, and can now be treated safely with an insecticide. Insecticidal sprays, and coils and electric mats, for use around the house can help in keeping mosquitoes at bay.
Biting flies are distributed throughout the world and, apart from nuisance biting; some are responsible for the transmission of diseases in humans and livestock in many countries. Although most biting flies (other than the mosquitoes) do not transmit diseases to humans they are renowned for painful bites and annoying habits.

The biting flies of greatest significance are the horse flies or March flies, the stable flies and the black flies, as well as the biting midges or sand flies and the mosquitoes.

March flies and stable flies will attack humans, livestock and domestic pets to acquire blood. The flies are stoutly built and are strong swift fliers that tend to be more active throughout the summer months especially in still, open sunny areas. The House flies, especially, are influenced by weather and will respond to changes in barometric pressure, wind, cloud cover and temperature.

The stable fly is a vicious biter with piercing and sucking mouthparts that can easily penetrate socks and stockings. Both sexes of this fly will search for blood meals, often twice a day, and can engorge on blood up to three times their own body weight. These flies are seldom found in urban situations (except where horse stables or major composting areas are nearby) and are more often associated with rural properties and domestic animals; they are also common on some beaches where they breed in seaweed. They have been known to enter homes and other buildings to blood feed during daylight hours.
March flies have two large prominent eyes and are much larger and robust than stable flies; they have a shorter life than stable flies. Although they are a major pest of livestock, several species will bite people. It is only the females that seek blood meals; the males feed on nectar and plant juices. Females are armed with two large blade-like mouthparts, that are used to pierce and slash skin. This inflicts a painful wound and produces a large puncture site that will continue to ooze blood long after the mouthparts are extracted. As the blood flows, the flies lap the blood to engorgement, unless disturbed. Adults are cosmopolitan but are more abundant in moist forests and woodlands. March flies are pests throughout summer and are a continual nuisance at outdoor activities, particularly near water.

**Clinical Presentation**

Biting flies can produce an array of symptoms including pain, itching, urticaria and cellulitis. An allergic response is the most common, which may be characterized by hives, and in some cases wheezing. March fly bites are very painful, with some individuals developing severe lesions, fever and general disability. This allergic response is due to the large amounts of saliva injected by the fly to prevent their blood meal from clotting. Stable flies bites are quite painful and they produce small papules that quickly fade, but are often itchy. Local symptoms can be relieved with an application of antiseptic lotion or cream and in some cases a mild oral antihistamine is prescribed. Prolonged scratching of bites may lead to secondary infections. Hypersensitivity to biting flies is rarely seen in human population.

**Laboratory Diagnosis**

Biting flies are identified with the aid of a stereo microscope and taxonomic keys.

**Treatment and Control**

Elimination of potential breeding sites will help in reducing fly numbers. Stable flies are attracted to decomposing organic waste, such as piles of grass clippings and compost heaps. Properly maintained compost heaps that are turned regularly will deter flies from ovipositing and thus discourages breeding. The use of repellents that contain DEET will generally deter most biting flies.
Ticks are bloodsucking, ectoparasites that are often encountered by people after outdoor activities. Although most cases of tick bites are uneventful, some can result in life threatening illnesses.

Tick species can be divided into two families. The soft ticks are represented by only a few species and are often associated with nests or resting places of animals. These ticks have a wrinkled appearance which is akin to soft leather. The hard ticks comprise the majority of our ticks and are distinguished by a hard dorsal plate in the shape of a fingernail and elongated mouthparts that have rows of backward pointing teeth. Some species of ticks use these teeth in conjunction with cement like substances to help maintain their position on the host. Hard ticks are found in a variety of habitats but are common throughout the ground/shrub layer of forests. They have very few predators, and are more likely to succumb to desiccation from high temperatures and low humidity. From the enormous numbers of eggs (2,500-3,000) deposited in the moist leaf litter by the female before she dies, only a fraction of the eggs will survive and hatch after 40-60 days incubation to a six legged larva. To molt to the next stage, a blood meal must be obtained by the larval tick. This is achieved by displaying a behavior referred to as "questing", each tick climbs to the top of nearest vegetation and waves its forelegs to and fro in order to make contact with a prospective passing host. This is usually a native animal, but may be a human. This questing behavior is undertaken each time a host
is required for blood. Once a suitable host is found, the larva will blood feed for 4-6 days, drop from the host and molt to the eight-legged nympha stage. Nymphs require a further blood meal before molting to the adult stage. Both female and male ticks quest for a host, but for different reasons; the female for a bloodmeal, the males to search the host for female ticks in order to mate and feed from them. Male ticks rarely bloodfeed on a host.

**Clinical Presentation**

Lyme disease is an infection caused by spirochaete bacteria. Symptoms are varied and includes rashes, fever, muscle and joint pain, and arthritis. The disease is not fatal and treatable with antibiotics.

**Laboratory Diagnosis**

All stages of ticks are identified with the aid of a stereo microscope and taxonomic keys.

**Treatment and Control**

The best method of avoiding ticks is to stay away from known tick infested areas. If visiting such an area, light colored clothing should be worn as ticks will be easier to detect, and a repellent that contains DEET should be applied. All clothing should be removed on return from a known tick area and the body searched for ticks especially behind the ears and on the back of the head. If a tick is detected it should be removed as close to the skins’ surface as possible with the aid of a fine pair of forceps using a firm grip. Do not grasp the body of the tick and pull; this can cause the tick to inject more toxins into the host. Alternatively, prior to the removal of the tick, a small amount of repellent (which contains DEET) can be placed onto the body of the tick while it is still attached, this will kill the tick within 20-30 minutes. If part of the tick’s mouthparts are left behind embedded in the skin these will eventually slough off with loose skin and there is no reason for concern.
Bedbugs

Natural History

The bedbug has specially adapted mouthparts for piercing and sucking blood. Bedbugs have worldwide distribution and have been associated with human habitation for many centuries.

Bedbugs are wingless insects with flattened oval shaped bodies that are segmented, measuring approximately 5mm in length as adults but the nymphal (immature) stages are smaller. Each bug has six stout legs that enable them to move rapidly when disturbed. They are pale brown in color, which changes to a red brown with a blood meal. Their head is short and broad and equipped with a pair of prominent antennae and two dark compound eyes. The sucking mouthparts are held close beneath the head and thorax when not in use, and swung down into position before feeding. Most blood feeding occurs at night, and particularly in the hours before dawn. At daylight the bedbugs seek shelter and become inactive while they digest their blood meal.

The bugs stay in close contact with each other and conceal themselves behind loose wallpaper, under the seams of mattresses, floorboards and in cracks and crevices of walls, paintings and furniture. Starving bedbugs have been known to venture out to blood feed during daylight hours, but only in darkened rooms. Bedbugs can survive for long periods without feeding and while their preferred host is human, they will feed on rodents, rabbits, bats, birds and some other warm blooded animals.
Bedbugs depend on blood for their complete nutrition and bloodfeed frequently where possible. They respond to the warmth and carbon dioxide of a host and quickly locate a suitable feeding site. At the commencement of the blood feeding the host’s skin is held by the forelegs of the bug and pierced by the mouthparts while injecting a small amount of saliva. It takes 5-10 minutes for complete engorgement. Each of the five nymphal stages requires at least one bloodmeal to molt to the next stage. The entire nymphal development takes 6-8 weeks, and there is no larval stage. Adult bedbugs can live for 6-12 months, and each female after mating will lay 2-3 eggs a day throughout her life. These cream colored eggs (1mm in size) are cemented on rough surfaces of hiding places, and will hatch within 10 days at room temperature, but longer if the temperature is cooler.

**Clinical Presentation**

Bedbugs are not natural vectors of any human diseases but can cause a great deal discomfort and distress to those who come in close contact with. There can be a distressing loss of sleep, and the afflicted individuals well-being and morale can be reduced. Common areas of the body that are affected involve the arms and shoulders with most bites resulting in a generalized allergic response. The wheals can be large (>1cm), and are accompanied by itching and inflammation, swelling, and occasionally blistering and excoriation of the skin. Wheals often subside to red spots (purpuric) which can last for several days. Local symptoms can be relieved by application of an antiseptic lotion or crème.

**Laboratory Diagnosis**

A bedbug infestation can be diagnosed by the identification of specimens collected from the infected residence. Collection of live or dead bedbugs, cast skins, hatched or unhatched eggs will determine an infestation.

**Treatment and Control**

Bedbugs have limited powers of dispersal beyond adjoining rooms, and their movement is dictated by the relocation of infected furniture and possessions to a new environment. Initially, minor infestations may result from the transfer, but the population of bedbugs will rapidly grow if left untreated. Heavy infestations are usually accompanied by a sweet sickly smell. This is due to the scent glands which each bug possesses that emit an odor for communication purposes.

Careful inspection of the infected premises should be undertaken to determine the extent of the problem before treatment commences. All possible hiding places within each room and other adjoining rooms or premises should be explored. Thorough and effective application of an appropriate insecticide by a qualified pest control officer should provide total eradication. Liquid sprays may need to be directed into wall and furniture cavities, and fumigation may be required. These control measures can eliminate popu-
lations but may be thwarted if other infected articles are imported. Good housekeeping practices and a reduction in possible hiding places such cracks and crevices will discourage repeat infestations.

Fleas

Natural History

Fleas are highly specialized bloodsucking parasites. They have a formidable reputation of claiming more victims than all the wars ever fought, as a result of the "bubonic" (Black Death) plague they spread throughout the world in the 14th century causing the deaths of over 200 million people. Now, these insects are better known for their irritation and pest status worldwide.

Fleas are light brown to mahogany in color and roughly oval shaped. Their laterally flattened appearance enables them to quickly move through the host's hair. Measuring 2-8 mm in length, the adults are entirely covered with a series of bristles and combs that assists them in clinging to the host. The small head is equipped with sawing and sucking mouthparts, and two tiny simple eyes. To aid in the detection of a host, fleas possess two short antennae on the head that are sensitive to stimuli including heat, vibration, traces of carbon dioxide and change in air currents and shadows. The hind pair of legs that are well developed for jumping enable fleas to be propelled 10-30cms, either to make contact with a host or avoid a threatening situation.
Both female and males fleas rely on blood for their nutrition, but can survive for several months without it. When a flea blood feeds, it will crouch low to penetrate the host's tissue with a sawing motion of the mouthparts. A small amount of anti-coagulant is injected with the saliva, to permit easy siphoning of the blood. Fleas will bite only accessible parts of the body and clustered bites on the lower limbs are diagnostic. Blood feeding maybe interrupted, and fleas will often probe several times before repletion which can increase their total body weight by 30%. The eggs are oval, white to cream in color and measure 0.5mm in length; they can hatch within 1 week, but this will be dependent on prevailing conditions as larvae are extremely sensitive to desiccation.

**Clinical Presentation**

Some fleas can attack a range of hosts, and their ability to transfer from one host to another allows for the possible transfer of pathogens including viral, bacterial and parasitic diseases. The main flea species that attack humans include the cat flea the dog flea, and the human flea *Pulex irritans*. The latter two species are relatively rare. The common cat flea is found on both cats and dogs, and is the species usually identified in attacks on humans and usually responsible for flea plagues. Cat fleas are the intermediate host for the dog and cat tapeworm, which is easily transmitted to humans.

The continual biting activity of fleas alone causes a great deal of irritation and distress to humans, especially during flea plagues. Reactions to the flea’s saliva are often delayed, with the formation of a wheal surrounding each puncture site within 5-30 minutes of the bite, accompanied by intense itching. Within 12-24 hours each wheal may progress to a small lesion or vesicle. The onset of symptoms in sensitized individuals often develops much later, and the initial reaction may become apparent only after 12-24 hours. Fleas are the major cause of papular urticaria and continual scratching may lead to secondary infections. Local symptoms can be relieved by application of an antiseptic cream or lotion.

**Laboratory Diagnosis**

Identification of fleas is performed with the use of light microscopy and taxonomic keys.
Treatment and Control

With the increase in carpeted homes, central heating and number of household pets, flea control is a continuing problem for pest controllers and pet owners. The prolonged periods of warm, humid weather in the summer months provide ideal conditions for fleas to flourish. Typically, concentrations of the immature stages of fleas (eggs and larvae) will be found in areas where pets feed and rest, and control measures should be targeted at any such areas, in addition to their housing, basket, blankets and the pets themselves. Regular vacuuming of floors and washing of pets and bedding with an insecticidal preparation will aid in control. Newer products with insect growth regulators (e.g. in aerosol "bombs") are readily available in supermarkets and provide an economical means of eradication by fumigation of a home, but they should only be used as directed. Continual reinfestation of fleas in homes may indicate the source has not been detected and may require intervention by a reputable pest controller.

Head Lice

Natural History

Head lice are blood sucking ectoparasites of humans that have world wide distribution. This common human parasite is strictly host specific and does not affect other animals. An adult head louse is a small six legged insect, 2.5-3.5mm in length, with well developed eyes, small antennae and a flattened light brown body which is slightly lobed at the margins. The claws on each leg enable the lice to hold on to hairs, and they can run quickly over the scalp through hair. Head lice live their entire life (about a month) on the
head of their host, and are often concentrated towards the back of the head and above/behind the ears. All nymphs (immature stages) and adults blood feed on the surface of the scalp until fully engorged, and can feed at any time of the day or night. A female head louse can lay 6-8 pale colored oval shaped eggs (or nits) a day, and may lay 300 eggs within her lifespan. The eggs are glued to the base of the hair shaft and grow out with the hair. Most eggs hatch within 7-10 days but some can remain unhatched for up to 3-4 weeks. Individuals who have a head louse infestation will have on average 10-20 lice at any given time. Without a bloodmeal and the humid environment their human host provides, head lice will only survive a few days. They cannot infest furniture, bedding, pets or other household situations - they must have a human host.

Transfer of head lice to individuals is by hair to hair, head to head, close bodily contact. Sharing combs, brushes, ribbons, hair bands, hats, pillows and similar personal articles is the other main way that lice can spread. Lice will not voluntarily leave the scalp. Head lice tend to be more common among children than adults, and do not discriminate between sex or hair color - although lice in lighter colored hair may be more difficult to detect. Head lice do not prefer dirty or unkempt hair, but may go unnoticed and proliferate in such an individual compared with one who pays attention to their hair. However, an infestation should not be seen as a reflection on personal hygiene, home environment or social status, and should not be seen as a social stigma.

Clinical Presentation

An infestation of head lice may not be noticed initially, but with time will produce irritation leading to scratching of the scalp. Persistent scratching can cause development of lesions, which may give rise to secondary infections and, in some cases, even swollen lymph glands. Lice are a nuisance and can disrupt people’s rest, but they are not responsible for the spread of any infectious disease-causing organisms.

The detection of eggs of the shaft of the hairs is the most common method of identifying a head louse infestation, and it usually indicates the lice have been established for some time. In addition to observing the lice throughout the hair, further evidence of head lice may be seen on pillows or bed linen in the form of dark powder (faeces of the louse) or cast skins. Heavy infestations of head lice, if left untreated, result in matted hair interspersed with lice, their cast skins and faeces, plus attached eggs and egg shells, and may eventually develop a putrid odor.

Laboratory Diagnosis

Identification of louse specimens is by light microscopy. Details from the patient on exactly what part of the body the specimens were collected is important in establishing the identity of the louse. The body louse is taxonomically impossible to differentiate from the head louse, but body lice are never found on the head (they are most often in the clothing where they lay their eggs attached to cloth fibres) and head lice are generally not found on other parts of the body. Pubic lice are typically found in the pubic and perianal
areas but are occasionally found in hair on the trunk and head, including the beard and eyelashes.

**Treatment & Control**

Head lice are contagious and infect a large number of school age children annually. When a case of head lice is detected the person should be treated immediately with a preparation obtained from a pharmacy. A wide range of liquid products (and fine toothed combs) are available and a prescription is not necessary. Products with permethrin or malathion are usually recommended. One or perhaps two applications are advised and all family members, and other close contacts, should be treated at the same time. The presence of unhatched nits or eggs after the preparation has been applied is not necessarily a sign of treatment failure - the treatment will not separate eggs from hairs, they must be physically removed - but the presence of living lice indicates either a treatment failure or a reinfestation.

Some people may experience itchiness after a treatment but they should be careful to not automatically suspect persistence of lice, and should not automatically reapply the anti-lice products to relieve their discomfort. Routine or repetitious use of these preparations is unwarranted and expensive, and can lead to further irritation and other skin problems.

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**Pubic Lice**

Natural History

Pubic lice are commonly referred to as crab lice or simply ‘crabs’. This name has come from the crab-like appearance and slower movement compared to other lice that can infest humans. Pubic lice are found worldwide, they are haematophagous (feeds on blood), and strictly host specific to humans. Typically, they infest the hair of the pubic and perianal regions but are occasionally found in other areas where the hair is sparse and coarse. This includes the hair of the beard, moustache, eyelashes, armpits, and sometimes the chest and abdomen. The hair on the scalp is usually unsuitable, because of its fine texture closeness of the shafts, but pubic lice are occasionally found at margins of the head on the hairline.

The pubic louse is gray in color, and smaller (1.25 -2.00mm) than the head and body louse. Their body shape is oval and broader than long, with four distinct lobe-like protuberances on each side of their abdomen. The lice have a small head with short antennae and simple eyes. Each of the six legs of the louse terminates in a claw, but claws on the second and third pair of legs are huge compared to the first pair, which are slender. Within each claw there is an associated thumb-like projection which enables the louse to grasp body hair, securing them while they feed on blood using their mouthparts which are especially adapted for piercing and sucking. The lice blood feed intermittently over several hours. Adults and the three smaller nymphal stages usually remain and feed in a settled position. Pubic (and other lice) lice cannot burrow into the skin and do not live under the skin.

The life span of adult lice is less than a month. A mature female louse will lay a total of 30 eggs (nits), laying up to 3 eggs a day. The eggs are smaller than the eggs of the other human lice, and are a darkish-brown with an opalescent sheen. Each egg is cemented to the shaft of coarse hair, and at skin temperature will hatch within 6-8 days. If the lice are forced off the host they will die within 24-48 hours. Pubic lice cannot infest the rooms or carpets of an infected person.

Pubic lice are usually transmitted by sexual contact, and although this is the most common method, it is incorrect to assume this is the only means of transmission. Shared bath-towels and clothing, discarded clothing hanging in overcrowded locker rooms, children sleeping with an infected parent, or bedding that has recently been vacated by an infected individual can lead to infestations. Pubic louse infestations cannot be transmitted from animals. No known disease causing organism has been transmitted by pubic lice.

Clinical Presentation

At each puncture site a red papule develops and the immediate area swells. Intense itching is common due to the host’s reaction to the foreign proteins in the saliva of the louse. If the infestation is left untreated, the infected individual can become sensitized. Continual scratching may lead to secondary infections, and in some cases swollen
lymph glands, due to bacterial infection. If the infestation involves the eyelashes, and left untreated, the eyelids can become swollen and inflamed. With the majority of infestations, after the pubic lice have fed, a characteristic gray-blue or slate coloration appears at the feeding site, which may last for days. The colored area can be 0.2-3.0cm in diameter, and may have an irregular outline deep in the surrounding tissues, although this does not always occur for each infestation of pubic lice, it is more characteristic of pubic than for body lice. This discoloration is thought to be a result of altered human blood pigments or a reaction to substances excreted from the louse’s saliva.

**Laboratory Diagnosis**

Identification of louse specimens is by light microscopy.

**Treatment & Control**

When pubic lice have been identified as the source of the problem, it is important that all sexual contacts of that person be made aware of the situation and treated if necessary. If one person within a family has pubic lice, all family members should be examined and treated, especially if the infected person shares a bed with other family members. Treatments for pubic lice are similar to those for head lice, and can be purchased from any pharmacy without a prescription. For eyelash and eyebrow infestations, an application of petroleum jelly twice a day for 7-10 days can be effective in controlling the lice. Careful mechanical removal of eggs will be required, as the lice apply cement like substances when gluing the eggs to the hair and they are difficult to remove. The infected person’s underwear and bed linen should be washed in hot water, followed by hot tumble drying to ensure all lice have been killed. Spraying rooms or beds with insecticides is unnecessary, as the lice can only survive for a limited time without a host.
Assassin bugs, sometimes known as conenoses or "kissing bugs," are occasionally found in the home (bathtubs, sinks, drains, etc.) and, if handled carelessly, can inflict a very painful bite, causing a severe reaction in some persons. Some are attracted to lights and require blood meals to complete their development. Many are bloodsucking parasites of mammals, including humans. Others are predators, feeding on bed bugs, flies, caterpillars and other insects. These bugs have a long narrow head, short beak (three-segmented), long slender antennae (four-segmented) and an abdomen often widened at the middle exposing the margins of the segments beyond the wings. Occasionally, they are confused with the leaf-footed bug which is distinguished by its flattened (leaf-like) hind legs.

**Identification, Biology and Behavior**

**Bloodsucking Conenose**

Adults are 3/4 to 13/16 inch long, brownish-black, broad, stout-bodied with six reddish orange spots on each side of the abdomen, above and below. Eyes are large with an elongate protruding head. The beak is not curved (slender and tapered) and almost bare. It is kept folded back between the front legs when not used. Adults are winged and able to fly. They are found in nests of rats and will feed on any animal including humans. Oval, pearly-white eggs are laid singly from May to September. Each batch is laid after a blood meal.

The conenose is a vector of Chagas disease prevalent in Mexico, Central America, and South America, where these bugs may colonize human habitations. This sometimes fatal disease, caused by a flagellate protozoan, has symptoms of swelling of the eyelids and face, loss of nervous control, high fever, anemia and destruction of the cardiac and skeletal muscles. This disease is not common in the United States.

The bloodsucking bugs are active at night usually feeding on sleeping victims. These bugs are usually found outdoors in hollow trees, in raccoon and opossum dens, or near wood rat nests. Indoors, they are found in bedding, floor and wall cracks, under furniture, etc. They are poor fliers and sometimes attracted to lights. Bites are sometimes painless, but may cause a severe reaction. They are more often a problem to people living in wooded areas.
Masked Hunter

Adults are 3/4 to 7/8 inch long, chocolate brown, beak curved (not slender and tapered), with slender antennae and walking-type legs. They are called "kissing bugs" and are attracted to lights. They are very active and enter houses in search of bed bugs, flies, and other insects. Eggs are laid singly in the dust in cracks and corners. Nymphs have the body, legs, and antennae covered with a sticky substance to which dust and lint adhere especially on the head (thus, the name, masked) and are only visible when moving. Bites are very painful on humans.

Wheel Bug

Adults are 1-1/4 inch long and have a slender, long antennae (reddish-brown). The body is grayish-black with an upright one-half "cogwheel-like" crest on the thorax bearing 8 to 12 protruding teeth-like structures. The membrane of the front wing is coppery colored. Wheel bugs are rather uncommon, but attract attention when found due to their bizarre appearance. They are voracious predators, attacking large caterpillars, such as tomato hornworms, and suck them dry. They will not bite humans readily, but when they do, the bite is very painful.

First Aid

Bites may be hardly felt by the bloodsucking conenose in contrast to painful bites by the masked hunter. Sensitive individuals may experience burning pain, intense itching and much swelling with red blotches and welts over the body. If bitten, remain calm and safely collect the bug for positive identification. Do not handle bugs without gloves. Relief from bites may be obtained by using lotions containing menthol, phenol or camphor.

Control Measures

Prevention

All potential breeding areas such as rodent and bird nests and trash piles in or near houses should be eliminated. Since these bugs fly at night and are attracted to light, adequate screening must be used around windows and doors. Non-attractive insect yellow lights should be used, if possible. Should a bug alight on one's face or hand, it should be brushed off gently since it is likely to bite if pinched or crushed. Usually only a few individual bugs are found in the home at one time except for the bloodsucking conenose, which may be in groups of 10 to 15 at a time or scattered singly. Do not handle bugs. Use a broom and dustpan or vacuum cleaner to collect and discard individuals.
**Insecticides**

A household aerosol spray of pyrethrins can give good knockdown and kill against individuals. These bugs can be controlled with a spot treatment of a residual household crawling insect spray such as diazinon or propoxur (Baygon). Pyrethroid insecticides such as permethrin is the most effective at high concentrations. Before using any Insecticide, always read the label, follow directions and safety precautions.

Source of information for this booklet was taken from Department of Medical Entomology.

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**Department of Medical Entomology**

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