

non-chlorinated water supplies in Tennant Creek and Aboriginal communities.

What should I do?

- Keep up your usual pool maintenance, and if you are worried, clean and chlorinate your pool as soon as you can. But remember, there is no known case of anyone contracting meningitis by bathing in a maintained backyard pool
- Empty and clean small collapsible pools daily
- Children should not play with or drink directly from hoses and sprinklers (as this

reduces the chance of water being forced up their nose)

- Keep your head above water in spas, thermal pools and freshwater bodies
- If you've been away or can't smell chlorine in the water, run the tap for a few minutes

And remember, you cannot contract this rare form of meningitis by drinking water containing *Naegleria fowleri*.

For further information about *Naegleria fowleri* please contact the Environmental Health hotline free-call 1800 095 646 during business hours.

Bites and stings in the Top End and how to avoid them

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The Top End of Australia is home to a number of mosquitoes, biting midges, and a wide range of other insects that can leave locals and visitors alike with unwelcome pain or discomfort, as well as potentially contracting an arthropod borne disease.

Faced with a daunting array of biting arthropods (invertebrates with jointed legs; insects and spiders etc.), many people often ask, "what is the health risk of this or that insect, what is the best way to protect against the bites and stings, what repellent is the best, or even do sand flies really urinate on your skin?"

This introduction to the various culprits and the range of ways to protect yourself will hopefully help make your life in the Top End less painful and a lot safer.

What are the most dangerous insects?

The most dangerous insects in the Top End are mosquitoes. There are just over 100 species in the Northern Territory (NT). Some species prefer to bite certain animals such as marsupials, frogs, or birds, while other species will feed on any animal including humans. Over 20 species in the NT bite people often enough to be labelled

serious pests. Some are just annoying pests, such as the common brown house mosquito (*Culex quinquefasciatus*) found in septic tanks and old tyres, and the big black Anopheles mosquito (*Anopheles bancroftii*) common near paperbark swamps. However others can carry viruses that can cause human disease.

Public health enemy number one in the Top End is the common banded mosquito, *Culex annulirostris*. It is the most numerous and is present all over the Top End. This mosquito can carry the entire range of insect borne viruses that are currently known to cause human disease in Australia, which includes Murray Valley encephalitis, Kunjin, Ross River, and Barmah Forest virus disease. It is also capable of carrying Japanese encephalitis virus, which has the potential to enter the Top End from nearby Papua New Guinea, East Timor or Indonesia and cause outbreaks of a sometimes-fatal disease.

Of those viruses currently known to be in the NT, Murray Valley encephalitis virus poses the highest health risk. It has caused 29 cases of disease in the NT in the last 30 years and resulted in 6 people either dying or being left with severe brain damage. It can also carry Ross River virus, which affects up to 300 people in

the NT each year, and can result in months of debilitating lethargy and painful arthritis.

The common banded mosquito breeds in a wide range of freshwater areas including those associated with rivers or drainage lines, swamps, extensive irrigation areas, and wastewater disposal facilities. It flourishes from the early wet season to mid June, with higher numbers around the big coastal flood plains and swamps of the larger river systems. Luckily this mosquito feeds just after sunset and during the first hour of dark, so is very rarely encountered in the day except in dense shade such as rainforest patches.

One of the most annoying and painful insects is the salt marsh mosquito *Ochlerotatus vigilax*. This mosquito can carry Ross River virus and Barmah Forest virus, which can cause an arthritis like illness (Fact sheets available from http://www.nt.gov.au/health/cdc/fact_sheets/fact.shtml). While these diseases cannot kill, they put more people off work than any other insect in Australia. These mosquitoes breed prolifically in salt marshes near tidal areas and the upper edge of mangrove margins after heavy rain or the highest tides of the month. The adult females all disperse from their breeding sites looking for blood 10 days after spring tides or heavy rain in the August to January period. In the dry season they only live for around a week, but in the wet they can survive for 2 or more weeks. Their flight range is more than 10 km but the highest numbers are found within 3 km of their breeding sites. They can bite at any time, even during the day, although more often in shaded areas by day, and increase in biting intensity around dusk and for the hour after sunset. They can be unbearable in or near mangroves or forest areas during the day and their very high numbers can make the unprotected person's life unbearable.

Fortunately you can't contract dengue in the Top End, as the dengue mosquitoes (*Aedes aegypti* and *Aedes albopictus*) are not present. Although we have at least 4 local *Anopheles* mosquito species that could carry malaria you would be extremely unlikely to contract this deadly blood parasite. No malaria has been transmitted in the NT since 1962. Our protection from malaria relies on our good public health measures that rapidly detect malaria infected overseas

travellers and prevent them from infecting our local mosquitoes.

What other arthropods cause pain or health problems?

The insects and arachnids that can cause painful and annoying bites or injury include wasps, itchy caterpillars, stinging caterpillars, stinging ants, march flies, spiders, scorpions, centipedes, and a few others. Most of these rarely cause longer-term after effects or death.

One very dangerous arachnid includes the scrub typhus mite (*Leptotrombidium deliense*). The larval stage of this very small mite is encountered near rainforest patches after being accidentally picked up on legs from grass as people wander through or sit down in mite infested sites. Bites from these mites can cause scrub typhus disease. Telltale mite bites are usually on the trunk at clothing restrictions, while the signs of infection with scrub typhus are fever accompanied by a small black scab like sore. Luckily in the NT this mite only inhabits areas around Litchfield Park, so awareness and protection by repellents can reduce the hazard.

Another potentially dangerous arachnid is the red back spider (*Lactrodectus hassellti*). This distinctive black globular spider with a red (or rarely orange) stripe down the centre of the abdomen is often found in an untidy web in dry rubbish, equipment or stored items under and around the outside of buildings. Bites are usually from accidental contact. The pain is intense and characterised by sweating at the site of the bite.

There have been no deaths in Australia since at least 1956. Contact can often be avoided by awareness and inspecting under likely harbouring sites. A close relative of the red back, the brown widow spider (*Lactrodectus geometricus*), is becoming more common in the Top End. Although similar in shape and size, it lacks any red or coloured stripe on the top of the abdomen and has yellow marking on the underside of the abdomen which are diffuse markings compared with the red back and is substantially less venomous. However painful bites should still be treated as a red back bite by seeking medical care and expert identification of the spider. It can also be recognised by the spiky

appearance of the white round pea size egg sack usually present in the web with the female, compared with the smooth round egg sack produced by the red back.

Spiders with potentially painful bites include the jumping spiders (family *Salictidae*) and the mouse spider (*Missulena priunosa*). The male mouse spiders are most frequently seen and this large black aggressive spider has a distinctive light bluish-white abdomen. It is mostly active at night on the ground as it searches for the females in their burrows, so footwear and a torch are a good precaution. It is sometimes erroneously called the white tailed spider (which is not present in the NT and which has been falsely accused as the cause of a creeping skin disease). The bite of the male mouse spider causes an intense pain that can last for hours, but there are no records of serious health effects or deaths from this spider. Most other spiders in the Top End only cause localised pain, but if pain persists or other symptoms occur, seek immediate medical advice and take the spider in a jar for expert identification.

Native insects with the potential to cause much pain are the wasps and the stinging ants. Paper wasps (Family *Vespidae*) frequently nest in dense vegetation or under large leaves such as *Pandanus*. Any disturbance of their paper nests unleashes a flurry of winged warriors that home in on the face and eyes. If you disturb a nest, keep your head down and run!

The stinging ants (*Odontomachus* sp) are frequently encountered in or near monsoon forest areas, or residential areas that were formerly monsoon forest areas. These large black ants sometimes jump or click when disturbed but are usually slow moving and only found on the ground. The nests have distinctive volcano like entrances. They have large nippers but sting from behind, much like a wasp. The best protection is good shoes in areas where they frequent. Both these ants and wasps inflict a very painful sting that can last for 20 to 30 minutes. Some people suffer allergic responses to the venom of this group of insects, which includes the introduced honeybee, but does not include our native small black sugar bag bees (*Trigona* sp) that cannot sting. Allergic responses can progress to anaphylactic shock, which can be life threatening. Avoidance is the best policy, but

sensitive people should carry medication such as an antihistamine, and seek medical help if severe symptoms develop.

Frequently encountered but rarely seen painful insects include the stinging caterpillars. There is a range of these but the most common one, the cocky apple stinging caterpillar (*Thosea penthima*) is found on the cocky apple (*Planchonia careya*) and the Kakadu plum tree (*Terminalia ferdinandiana*). These light yellow, oval shaped, flattened larvae range in size from 5mm to 15mm. They look like a spike-armoured limpet, with stinging spines all around their margin and on top of their body. They are common in the early wet season and most frequently encountered by bare legs brushing against leaves when walking through low regrowth in open forests. A sharp sting, somewhat like a wasp sting, results from contact with the stinging spines, and appears as a red, slightly raised area of skin that continues to be painful for 15 to 20 minutes. The best protection is to be familiar with the food plants and avoid bare skin contact with their leaves.

The most unbearable insects in the bush are probably the hairy itchy caterpillars. There is a range of species of these caterpillars, which include the stringy bark caterpillar (*Euproctis stenomorpha*) found on the Darwin stringy bark tree (*Eucalyptus tetradonta*) and black wattles (*Acacia auriculiformis*), the freshwater mangrove caterpillar (*Euproctis lutea*) found on fresh water mangroves (*Barringtonia acutangula*) and the cocky apple (*Planchonia careya*), and the processionary caterpillar that is the larvae of the of bag shelter moth (*Ochrogaster lunifer*) (formerly *Teara contraria*) found on the cocky apple.

The stringybark caterpillar is chocolate coloured with a pale central stripe and a hairy appearance with 4 dense erect tufts of hairs on its back behind its head. It usually hides by day in the fissures of bark on the trunk and at the base of the food tree. The small pale larvae of the freshwater mangrove itchy caterpillar can hang by a silken thread, so just walking under these trees can make contact with these caterpillars. The larger larvae hide in a silken shelter on the shady side at the bottom of the tree. The bag shelter caterpillars are dark brown with dense very long hairs and spend all day in the branches

of their food trees in their communal silk and leaf bag with lots of droppings.

All of the itchy caterpillars have poisonous hairs that are frequently shed as they grow and moult. Contact with the caterpillar or the contaminated leaves or bark can transfer the hairs to your skin and result in an intense itchy skin reaction with swelling and hives. Rubbing the affected areas can transfer the hairs to other areas of skin or eyes. Even touching the adult moth can cause serious swelling and unbearable itching. The most severe swelling reactions occur around the face and neck. Avoidance of the food trees and larvae is essential to avoid problems. If affected, wash all affected areas and clothing as soon as possible and avoid hand contact near the eyes.

The little known whiplash rove beetle (*Paederus australis*) can also cause very painful reactions. It is a small thin orange and black beetle 2-3 mm long and inhabits the sub coastal flood plains during the wet season, particularly around the lower reaches of the Moyle, Daly, and Mary rivers. It is strongly attracted to light at night and is frequently encountered when sleeping under or sitting near lights. These beetles have a powerful blister agent in their blood and as a secretion from the tip of their abdomen. If you crush or disturb them, you inadvertently apply the blister agent to your skin. The blister agent cannot be felt for about 24 hours, after which a painful red raised blister and surrounding swelling occurs that progresses to a welt like appearance. The characteristic linear whiplash lesion is made by swiping the beetles off your skin and inadvertently applying the blister agent as a streak. Recognition of the beetle and avoidance of contact is the best protection. If contact is made, a quick flick with the fingernail and an immediate wash of affected skin with soap and water will prevent any blistering.

Probably the most annoying and most frequently encountered insect around the coast of the Top End is the ornate mangrove biting midge (*Culicoides ornatus*), sometimes known erroneously as a "sand fly". There are 3 species of biting midges found in high numbers in mangroves but the ornate mangrove midge is the only one that disperses out of the mangroves in large numbers. This midge breeds mainly in the mud in the upper neap tide area of mangroves, particularly in the bare creek banks in the upper part of small tidal creek tributaries just before the mangrove canopy starts to close over.

The midges have seasonal peaks from August to November and are most active for the 5 days around the full moon and new moon, with the full moon numbers being twice as high as new moon numbers. They are most active in the evening and early morning. Biting midges bite to take blood, which is necessary for the development of their eggs. They have very small biting and sucking mouthparts. They make a small pool of blood just under the skin by moving their rough mouthparts in and out. They then suck up a mixture of blood and their saliva. Luckily biting midges do not carry any human disease in Australia, but they can cause painful bites and the skin reactions can be real problems.

Why do mosquitoes or midges cause reactions?

When a mosquito or biting midge bites, fine stylets sheathed in the proboscis are inserted into the skin. Blood is sucked up through one of the channels in the stylets, while saliva is injected down an adjacent channel. This saliva can contain a number of chemicals including an anti clotting agent and histamine like substances that the human body recognises as foreign. It is this saliva that causes the burning sensation or painful reactions. So in answer to the question posed at the beginning of the article, "sandflies do not urinate on your skin!" Biting midges do not transmit diseases to humans in Australia.

Some people can become very sensitive after being bitten and suffer a local or general reaction from further bites. People bitten without any immunity to the saliva experience an initial skin reaction that usually causes a small blister. The bites may itch for days, producing restlessness, loss of sleep and nervous irritation. Scratched bites and broken skin can lead to secondary bacterial infections and result in painful sores and disfiguring scars. On the other hand, many people become tolerant to particular species after repeated bites over a long period, and some can experience no pain, red spots or after-effects.

How do you avoid mosquitoes and biting midges?

The best way to prevent bites is to avoid their breeding or surrounding sites at times or seasons when these insects are likely to be prevalent. The salt marsh mosquito is found in the upper high tide areas near poorly draining mangrove creeks

or low-lying tidal or brackish areas, particularly near large salt marsh habitats. The period of high salt marsh mosquito activity is usually during the late dry season and early wet season. Generally they are prevalent for 1-2 weeks, starting 10 days after the highest tides of the month or rain over 20 mls in 1 day. Dense vegetation within 2 km of the breeding sites should be avoided during the day over this period.

Areas of high activity of the common banded mosquito and many other mosquitoes include the large seasonally flooded areas associated with poorly defined rivers or drainage lines, coastal brackish swamps, extensive freshwater reed swamps and lagoons, extensive irrigation areas, and wastewater disposal facilities. Densely shaded areas near these habitats should be avoided during the day. Camping sites should be at least 3 km from extensive areas of these habitats. If camping near creeks, rivers or lagoons, choose localities of the water body which have steep margins or little marginal emergent vegetation, have swiftly running water with little marginal pooling or vegetation, or do not arise from or empty into a nearby swamp area. In more inland areas, locations on hills or rises at least 3 km from breeding areas should avoid the worst mosquito problems. In coastal areas choose exposed beaches or cliffs sites in open and windy situations where with the wind does not blow from the direction of the mangroves or swamps.

Biting midges are frequently found near extensive areas of mangroves. Those mangrove creeks with lots of small tributaries have more breeding sites and high midge numbers. These midges have seasonal and monthly population peaks, so plan your trips or activities around the tide table and calendar!

What are good self-protection measures against mosquitoes and midges?

The best method of avoiding attack at night is to stay inside insect-screened houses and tents or use a mosquito net. Mosquitoes accidentally admitted into tents or mosquito nets are generally easily seen and can be killed with a can of aerosol knock down synthetic pyrethroid spray. Synthetic pyrethroid chemicals are artificial chemicals more or less similar to the natural plant product pyrethrum obtained from

pyrethrum flowers, and are very effective at low concentrations. Pyrethrum and synthetic pyrethroids are toxic in their concentrated forms but generally have a low toxicity to humans when used as directed on the label. Generally they can be recognised by the ending "thrin" in their name.

Knockdown or space sprays aerosols are suitable for spraying up in the air and can be used inside houses or tents in close proximity to people.

Residual or surface sprays usually have higher human toxicity and are labelled for application to surfaces such as floors, walls, fences and vegetation, and never for spraying up in the air or in close proximity to people. When sprayed on or around screens, and outdoor living or recreation areas, they give added protection against mosquitoes or biting midges. Care is needed to prevent inhalation or skin contact, and some insecticide formulations affect screens.

Head nets, gloves and boots can protect parts of the body that are not usually covered by clothing. The additional treatment of head nets with a repellent or insecticide will discourage insect attack. Mosquito nets are particularly effective barriers. Thick clothing or tightly woven material also offers protection against bites. Light coloured, long sleeved shirts and full-length trousers are recommended. For particular risk areas or occupations, protective clothing or mosquito nets can be impregnated with permethrin or bifenthrin to give added protection. Sleeves and collars should be kept buttoned and trousers tucked in socks during biting insect risk periods. Protective clothing is very necessary in the evenings near areas of salt marsh, mangroves, or large fresh water swamps where the various species of mosquitoes may be abundant.

Camping upwind near congregations of stock or domestic animals can divert mosquitoes or biting midges to alternative hosts, as these insects use wind borne carbon dioxide exhaled from animals to locate potential blood sources. They fly upwind following sources of carbon dioxide and certain odours, and then home in on victims from other clues such as body heat and colour. Dogs of dark colour tend to attract some species of mosquitoes or midges more than lighter colours, and can divert some pests from people who are in the close vicinity.

Many mosquito and biting midge species are attracted to light. This can cause pest problems in unscreened houses or when camping. Yellow or red are less attractive than white light. White or ultra violet lights placed at a distance from a house or camp can serve to attract insects to an alternative area. This is more effective if the light is close to the breeding site, and between the breeding site and the accommodation area. The attractive lights should not be close to accommodation or directly down wind of accommodation areas. Lightproof curtains or similar screening can be very effective in reducing the attraction of biting insects to areas that are illuminated at night.

There are a number of emergency measures that can be taken when exposed to biting insects without any protection. Sheltering downwind next to smoky fires can offer considerable protection. Burning dung or aromatic oil producing leaves from plants such as horehound (*Hyptis*), black plum (*Vitex*), turkey bush (*Calytrix*), paperbarks (*Melaleuca* species) and eucalypts (*Eucalyptus* sp) can make the smoke more effective. Leaves of a small native plant known as warnulpu (*Pterocaulon serrulatum*) that has sticky strongly aromatic leaves, are used in fires or rubbed on the skin by traditional Aborigines in the Katherine district to repel mosquitoes. Choosing locations exposed to the wind can also offer protection from some species.

Some protection can be obtained by rubbing exposed skin areas with the leaves of those plants that contain volatile oils. However these are not as efficient as commercial repellents containing the chemicals diethyl toluamide (DEET) or picaridin. Other emergency protection measures include coating the skin with mud, or burying yourself in shallow sand with some form of head protection. If nothing else is available, keep running!

What is the best repellent?

Relief from mosquitoes or biting midges is best achieved by applying repellents to the skin and clothing. Many repellents affect plastics and care is also needed when applying them near the eyes and lips.

Repellents with DEET or picaridin give the best protection. Some specific repellent products, such as normal "Aerogard", which are formulated to repel flies, are generally not as efficient as formulations containing DEET. Brands such as *Rid*, *Off*, *Bushman*, or *Tropical Strength Aerogard*, containing formulations of around 19% DEET (usually expressed on the label as 190.0g/kg) are more effective than non-DEET products, or products containing less than 10% DEET. Most products with DEET in Australia contain less than 20% DEET as a precaution against possible skin effects in sensitive people. Low irritant repellents generally contain less than 10% DEET and are not as effective as higher levels of DEET. *Repel* brand contains picaridin, which is almost as effective as DEET but is usually less irritating to the skin for sensitive people and is approved for small children. Products with greater than 20% DEET, such as *Bushman's gel* or *Muskol gel* are usually the most effective but care is needed in sensitive people and these are not approved for use on children. Alternative repellents such as Dettol in baby oil, eucalyptus oil, tee tree oil, and other plant products are not as efficient as DEET or picaridin products and should not be relied on to give effective protection.

Application of repellents over large areas of the body or on extensive areas of children is not recommended. Protection from mosquito penetration through open weave clothes can be obtained by applying a light application of aerosol repellent to the exterior of clothing. Repellents should be supplementary and not regarded as substitutes for protective clothing.

Personal repellents are available as sprays, creams or gels. Aerosol sprays are usually alcohol based and tend to evaporate quicker. The creams last longer than the aerosol formulations, while the gels last the longest. Repellents generally only prevent bites from 2 to 4 hours, depending on the repellents, the species of biting insect, or the physical activity of the wearer. Some of the oil lamps, mosquito coils and incense sticks can act as repellents but are usually only effective in sheltered situations. Electronic insect repellents that emit ultrasonic or audible sounds do not offer any protection against mosquitoes or biting midges. They are based on a false premise that specific sounds

repel female mosquitoes, when in fact the reverse is sometimes true, and have been found scientifically to have no repellent effect to mosquitoes or midges.

Plants with reported insecticidal properties such as neem trees and the citrus plant have not been shown to act as repellents merely by their presence in the vicinity of people.

What is the best way to kill mosquitoes or midges?

Mosquitoes or biting midges can be knocked down inside tents or houses with knock down aerosols or space sprays.

Devices that can be effective at killing and/or repelling biting insects include insecticide impregnated mosquito coils or incense sticks, insecticide oil lamps, automatic insecticide dispensers and electric insecticide pads. The most effective of these usually contain an insecticide such as allethrin, transfluthrin or citronella oil and rely on the smoke or vapour to carry these chemicals in the right direction or to build up in a sheltered situation. These devices are effective in relatively sheltered or closed areas such as inside buildings or tents or where there are only slight breezes. They should be backed up with other measures such as suitable protective clothing or effective repellents containing DEET or picaridin.

Large-scale control of adult biting insects can be achieved for short terms (hours) by using portable or industrial fog generators, backpack misters, or heavy-duty ultra-low-volume aerosol generators to knock down active adult insects. The insecticide of choice is bioresmethrin because it has little odour, and is very effective against active flying insects using very small amounts of the active ingredient. Control relies on good access, open vegetation, and light breezes in the direction of the breeding or harbouring sites of the targeted insects. Application should only be during the peak biting insect activity period of those insects actually causing the problem, which is usually the late evening and early night.

Application of surface spray residual insecticides such as permethrin, deltamethrin, bifenthrin and lambda cyhalothrin sprayed as a mist spray to

point of run off on building surfaces, fences, lawns or nearby hedge vegetation can give medium term (a few days to a few weeks) relief. This method is very useful as a barrier protection when large numbers of mosquitoes or biting midges are present near accommodation or outdoor use areas.

One of the residual synthetic pyrethroids, bifenthrin, when used as a barrier spray, has been reported to provide at least 6 weeks protection from mosquitoes and midges in biting insect prone areas. It has also been reported as being very effective in preventing mosquito bites inside open tents when sprayed on the outside and inside of tent surfaces. There are now do it yourself applicators of deltamethrin or bifenthrin available from supermarkets and hardware stores.

These residual insecticides should be applied according to label recommendations. For outdoor areas they should be applied with the aid of a garden pressure sprayer or machine sprayer to apply large droplets and sprays, which do not carry on the wind. Care must be taken to avoid spray drift or run off with all synthetic pyrethroids around fishponds, fish tanks, creeks, and other nearby fish habitats, as these insecticides are efficient fish poisons.

Electric insect insectocutors and other trap or killing devices that use an attracting light, heat, odour, carbon dioxide or a combination of these have been claimed to clear areas of biting insects and thus protect people. Many of these claims have not been scientifically substantiated in outdoor situations with people nearby. While trap devices can attract and trap biting insects, as well as a range of other insects, these devices cannot be relied on for effective protection from biting insect attack. When used in outdoor situations it is possible that they can increase local problems by attracting insects to the general vicinity of people. Attractive odours and carbon dioxide emitted by humans then divert the insects from the trap device to the people. These devices can however be used to trap and kill mosquitoes midges in situations where there are localised biting insect problems and there is not consistent reinvasion of new insects. In these situations an array of traps could reduce the overall population of insects and act as a barrier to provide some protection for inner areas.

What is the best way to treat bites?

Various products either applied to the skin or taken orally, can give relief from bites and prevent secondary infection. The effectiveness of various products is variable, depending on individual reaction. Skin application products include proprietary products such as Eurax, Stingose, Medcreme, Katers lotion, Dermocaine and Paraderm creme, and non-proprietary products such as tea tree oil, eucalyptus oil, aloe vera gel, methylated spirits or ice.

Ice packs applied to the general bite site will usually give immediate relief for painful and itchy bites, and swelling or blisters from mosquitoes and biting midges. The sooner the ice pack is applied after bites or reactions, the better the relief, and this can often avoid more intense reactions.

Products for more general symptoms include antihistamine products such as Phenergan Telfast and Vallergan. Check with your doctor or pharmacist for the latest product and safety information.

So when you plan your next outdoor barbeque, or a camping or fishing trip, don't forget the other bites you may get. You can protect yourself from many biting and stinging insects by being aware of where they live, what they look like, and by taking evasive or avoidance action. Do some research and background checking of the area you are going to. You can plan where you will stay in relation to potential sources of biting insects, and you can take a range of protective measures such as impregnated clothing, repellents and insecticide treated nets and tents. It is better to be forewarned and forearmed than suffer the stings and bites of outrageous insects!

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