

# BITING AND STINGING ARTHROPODS OF PANAMA

by G. B. Fairchild  
Gorgas Memorial Laboratory

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## INTRODUCTION

1. The dangers and discomforts of camping and travelling in the hot and humid parts of the tropical lowlands are in a very large part due to the great numbers of ticks, flies, mosquitoes, ants and other small annoying or disease carrying creatures, which infest these regions. Although mosquitoes and biting gnats seldom occur in the tropics in the hordes which sometimes make life unbearable in more temperate regions, they are ever present, and of far greater variety. While only a minority of the species are true disease carriers, the incessant irritation caused by their activities coupled with the high rate for secondary infections associated with their bites and stings very materially lowers human efficiency and must cause in the aggregate a very considerable loss in man hours of work.

2. At the suggestion of Lt. Col. W. N. Elton, M.C., this brief summary of the arthropods directly affecting man in Panama has been prepared with the hope that may be of some assistance to medical and lineofficers having the care of troops stationed in this area. The future of medical entomology is very extensive, and is, except for a few excellent standard texts, practically unavailable to the average army practitioner. The standard textbooks available attempt for the most part to cover the world, and are so detailed, technical, and extensive, that considerable entomological training is needed to use them. The remarks herein will also apply in large part to other areas in the American tropics, although in other areas one or another group of insects will assume greater or less importance.

3. Flies, gnats, mosquitoes, ticks, wasps, etc., cause human injury in a variety of ways, but the types of attack may be roughly grouped under three headings:-

a) BITING INSECTS: Flies, mosquitoes, gnats, ticks, lice, red bugs, bed bugs and fleas all pierce the skin with their mouth parts in order to suck blood. The irritation caused by their bites is due to the various salivary gland secretions, which contain anti-coagulants to keep the blood from clotting in their digestive tracts. In some cases other irritant substances may also be present, perhaps to increase the flow of blood to the site of the bite. All the true disease carrying forms belong to this group.

b) Stinging and vesicating insects: To this group belongs the wasps, bees and ants, the scorpions and spiders, the stinging caterpillars and the blister beetles. In the case of the wasps, bees and ants, the sting is a modified egg laying structure and is purely defensive or offensive weapon. The poison is a rather complicated protein allied to snake venom. In scorpions, the sting is also for



defense or to kill other insects, while in spiders a pair of hollow fangs perform the same function. The stinging caterpillars are covered with stiff hollow hairs connected at their bases with a poison gland. The blister beetles contain a powerful irritant in their body juices, and are only harmful if crushed on the skin.

c) Insects living under the skin: Here belongs the human Bot-fly (Dermatobia), various myiasis-producing or wound-infecting flies and the chigger flea (Tunga). In the case of the flies, it is the maggot or larva which lives beneath the skin, feeding on tissue, blood and serum. The adult does not attack man in any way, except to see that its offspring find suitable food. With the chigger flea, it is the adult female which burrows beneath the skin.

4. The diseases occurring in Panama which are known to be transmitted by biting arthropods, the insect or tick involved, and the prevalence of the disease are summarized in the following list:

- a) Malaria - Anopheles mosquitoes of several species - Endemic practically throughout Panama.
- b) Yellow Fever - Various species of Aedes and Haemagogus mosquitoes - Only the jungle form known at present, apparently confined to the Eastern part of Panama.
- c) Relapsing Fever - Ornithodoros ticks of at least two species - Sporadic along the Pacific coast - probably more widespread than records indicate.
- d) Chagas Disease - Cone-nosed bugs of several genera and species - Sporadic along the Pacific coast. Clinical cases rare except in young children. Probably quite widespread throughout the Republic.
- e) Leishmaniasis - Sand flies (Phlebotomus), the transmitting species in Panama not known. The majority of cases from forested areas on the Atlantic side of the Isthmus.

5. A number of other insect transmitted diseases such as plague, typhus, spotted fever, onchocerciasis and filariasis have occurred or may occur here in the future, as the insect vectors are present. In addition, certain mild and self-limited fevers are suspected of being carried by insects, while a few diseases, such as yaws, may be spread by insects in addition to other and more usual modes of infection.

### MOSQUITOES

Nearly 150 species of mosquitoes are now known to occur in Panama, but the great majority of these are either too rare to be of much importance as pests or disease carriers, or they do not bite people. The biting mosquitoes are divided into two main classes, the Culicino mosquitoes, which include the common rain-barrel mosquitoes, the salt-marsh mosquitoes and many others, and the Anopheline or malaria mosquitoes. These two classes are separated from each other by a number of technical characters only visible with the aid of a microscope, but the following more easily seen differences will usually enable one to tell them apart.



Anopheles mosquitoes have a pair of long "feelers" or palpi on each side of the beak or proboscis, which are nearly as long as the beak. Their wings are usually covered with rather broad scales, some black and some white, grouped to form quite definite patterns of spots. Their bodies are rather bare, without many scales, and their bellies are usually without scales. In biting, Anopheles "stand on their heads", their beaks and their bodies forming practically a straight line, so that they look almost like small nails or short pins driven into the skin. The dangerous malaria carrier of Panama has the ends of the hind legs white.

The Culicine mosquitoes have the palpi much shorter than the beak, their wings usually appear bare, and, if broad scales are present, these are all of one color or form a speckled "pepper and salt" pattern. Their bodies are usually rare or less clothed with scales which are sometimes brilliantly colored, and their bellies are never entirely bare. On biting, the beak is bent down, forming angle with the rest of the body so that the body appears hump-backed.

Only a few kinds of biting Culicine mosquitoes are common in the bush. During the early part of the rainy season (June-July) the common salt-marsh mosquito is numerous, even at great distances from the coasts. This kind has black and white ringed legs, a beak with a white band around the middle, and the upper surface of the thorax is of a plain brown color. The wings are almost clear with narrow scales.

Another common bush mosquito (Mansonia) is larger, the legs less clearly banded, and the wings covered with scales which are mostly dark, but speckled with white.

Mosquitoes, aside from the annoyance of their bites, carry a number of human diseases, the most important of which, in Panama, is malaria. The Anopheles or Malaria mosquitoes fly and bite almost entirely at night, while a great many of the harmless mosquitoes fly during the day as well. The only way to avoid getting malaria is not to let Anopheles mosquitoes bite you. Always sleep under a mosquito net or in a well screened house, and get in doors or under your net before dark, 5:30 to 6:00 o'clock, and stay there until sunrise. If you must be out after dark, wear headnet and gloves, keep moving, and cover any exposed parts like hands and face and ankles with a good mosquito repellent or fly dope. Mosquitoes are more likely to be infected with the malaria germ near native settlements and villages, since, to transmit malaria, a mosquito must have bitten a person infected with malaria. So stay away from native habitations at night, and camp as far away from them as you can.

#### SANDFLIES, BLACKFLIES AND PUNKIES

These three kinds of biting insects are all tiny two-winged flies, mostly less than an eighth of an inch long, and thus considerably smaller than mosquitoes. The true sandfly (Phlebotomus), not the insect called by this name in the United States, is a small, long-legged hairy fly, not unlike a very small and fuzzy mosquito. It is pale brown or nearly white in color, very quick and jerky in its movements and the two slender pointed wings are covered with long silky hairs. At least 60 kinds occur in Panama, but only an expert



can tell them apart. They are known as "Chitra" by the Panamanians.

The larva is a slender whitish hairy worm which lives in moist dust under houses, in animal burrows and in sheltered hollows about the roots of trees in the jungle. Most species are jungle insects, probably biting animals, but at least 5 kinds bite people readily, and one often enters houses. They are small enough to be able to get through the average house screen or mosquito net, and only a very fine net will keep them out. The bite is very painful, being like a hot needle dipped in acid, and leaves quite an itchy swelling.

Sandflies are the carriers of a number of human diseases, only one of which, fortunately, is known in Panama. This is American cutaneous Leishmaniasis, a disease causing a large and disfiguring open sore or ulcer. The disease is fairly common in some parts of Panama.

The flies usually fly at night but will bite on dark days in heavy jungle and in native houses. The use of an extra fine mosquito net, and the application of some of the better mosquito repellents will keep them off.

The Blackflies or buffalo gnats, called "rodadores" in Panama, are small black or yellow flies from a sixteenth of an inch to an eighth long. They are rather thick-set and stout, with wide rounded clear wings, and generally with black and white marked legs. Some kinds are black, others grey or golden-yellow, and few have iridescent green or blue stripes. They are generally found near streams or rivers with a swift current, in which the early stages of the insect live. The larvae are white or greenish worms which cling by their rear ends to rocks, water weeds and trailing grass and branches in swift running streams.

About a dozen kinds occur in Panama, but only a few of them attack people at all commonly, and then only at certain times and places. They bite during the day, often in bright sunshine. The bite is nearly painless but within an hour or so there is considerable swelling, oozing of serum and even of blood from the bite, and severe itching, which may last several days. The bites are very likely to become infected if scratched. Protection is usually unnecessary in Panama, but fly dopes and mosquito repellents are quite effective. Blackflies transmit a serious worm parasite (*Onchocerca*) causing blindness in Guatemala and Mexico, but the disease is fortunately unknown in Panama.

The Punkies or no-see-ums, known as sandflies in the United States, are called "jejenes" in Panama. They are minute two-winged midges, less than one-twentieth of an inch long, rather compact and with short legs and usually dark spotted wings, although they are so small that not much of their appearance can be made out without a magnifying glass. The larvae are slender white worms that live in the mud and sand of mangrove swamps, the banks of rivers and marshes, and in the water in rot holes in trees and stumps. A good many kinds occur in Panama. One kind, which seems to breed in swamps along the coast, is a veritable plague at times, entering houses in swarms and making sleep impossible. They will also bite



during the day in shady places. The bite is surprisingly painful for such a tiny creature and itches badly for a day or so. Owing to their minute size, screens and mosquito nets give little protection, but a good mosquito repellent will keep them off. Punkies carry at least one disease in Panama, a kind of blood worm (*Filaria ozzardi*), but it does not seem to do much harm to the people who get it. They are suspected of carrying other diseases too, but proof is lacking.

### HORSEFLIES AND DEERFLIES

Some 180 or more kinds of these biting flies are found in Panama, where they are generally known as "Tabanos". They range from the size of a house-fly to well over an inch long, and are of many colors and patterns. Most kinds have green or bronze eyes, often striped or spotted with purple. The wings, of which there are only a single pair, may be clear, spotted or banded, or solid brown or black. Many kinds are striped, banded or spotted with yellow or white, and few have long slender snouts or beaks as long as the whole body. They are found nearly everywhere, but are most abundant in jungle areas and near streams and swamps.

Most kinds prefer to bite horses and cattle, but a few of the smaller species will attack people readily. The bite is quite painful, but leaves little after effect. Their attacks on horses sometimes render the animals unmanageable, and they are occasionally numerous enough to make life uncomfortable for the people in the bush, but for the most part they are a minor pest. They are suspected of carrying some diseases of animals, but are harmless to man, at least in Panama.

### TICKS

The tick, a small flat wingless insect-like animal, is furnished with eight legs and short beak. They are abundant throughout Tropical America, and about 30 kinds are known so far from Panama. The majority of ticks confine their attacks to various animals and but 3 species are known to attack man commonly in Panama.

Ticks are divided into two groups, soft ticks (*Argasidae*) and hard ticks (*Ixodidae*). The soft ticks have a leathery rough skin, the mouth parts are small and hidden in folds on the under side of the body, and the sexes are almost indistinguishable. The hard ticks, as the name implies, are of a shiffer consistency. The males have the whole back covered with a more or less shiny horn-like shield, which often bears a pattern of whitish lines and spots, while the female has a smaller oval or triangular shiny shield just back of the head. In both sexes the beak is prominent and sticks out nearly straight in front.

All ticks lay eggs which hatch into small larval ticks about the size of the head of a pin. These have only six legs, but are otherwise rather like the adults. These larval ticks attach themselves



to some animal or bird where they remain for a variable length of time, or until they have filled up with blood. They then melt or shed their skins, either on the host animal, or after dropping off. The resulting stage is termed a nymph, has eight legs, and is practically indistinguishable from the female adult. The nymph again fills up with blood, either on the same or another animal, and in course of time sheds its skin to become an adult. The adults differ a good deal in habits, some remaining on the host animal to make and fill with blood; when the females drop off, lay a very large number of eggs and die, while others return to the host for a meal of blood from time to time, laying small batches of eggs between meals.

In Panama, six species of soft ticks are known, and there are probably others. Argas porsicus, the fowl or chicken tick is common here, being found abundantly in chicken coops and hen houses nearly everywhere. The larvae sometimes bite man, the adults very rarely. Of the five species of Ornithodoros, three are known only from bats, whose roosts and caves they sometimes infest, while the other two, O. rudis and O. talaje are important human pests. Both species occur in native houses, probably throughout Panama, where they are known as "chinchas mamones", or simply "mamones". They hide by day in the dust of the dirt floors, in cracks in the wood-work and furniture, and in the cracks in the mud walls, from which they come out to bite the inhabitants during the night. The larvae, and probably to a certain extent the nymphs and adults, feed upon rats, and perhaps other small mammals. The adults are about 1/8 to 3/16 inches long, pinkish or bluish-gray, with a rough warty and wrinkled skin. The two species are quite similar in appearance but talaje is rougher, broader and often slightly narrowed in the middle.

These species are the vectors of human relapsing fever in Panama, a disease sufficiently common to make a knowledge of preventive measures necessary. The surest way to avoid getting bitten by those ticks is to stay away from native houses. During the day one is relatively safe, but, if one must enter houses at night, do not sit down on the floor or beds; remain standing, if possible, and keep moving around. Never sleep in a native house if it can possibly be avoided, even in one long abandoned. These ticks are very long-lived; single specimens are known to have lived over six years without food. If one must sleep in a native house, use a hammock, preferably your own, and in any event shake it out carefully, to be sure no ticks have lodged in it while it may have been lying on the floor.

Of the many kinds of Ixodidae or hard ticks, only one is at all a common parasite of man in Panama. This is the Cayenne tick (Amblyomma cajennense), which much resembles the common wood-tick of the United States. The adult ticks are about 1/8 to 3/16 inches long, the females reddish-brown with a triangular shiny shield back of the head which is marked with white blotches. The males are lighter, yellowish-brown, with a complicated pattern of white stripes. If allowed to remain attached, the females swell up with blood to the size of a large kidney bean. This tick attacks nearly all animals and even birds, but its favorite food sources are horses, cattle, deer and tapirs.



The eggs, to the number of several thousand, are laid on the ground, under stones, bunches of grass and in crevices, and all in the same place. Most females seem to lay their eggs in December and January, the young ticks hatching in a few week's time and crawling up grass stems, bushes and weeds to gather in clumps on the tips of leaves and twigs. Here they wait for any passing animal or man to brush against them, when they cling to fur or clothing, crawling quickly all over the body and attaching themselves to the skin and commencing to suck blood within a few hours. These baby ticks or larvae have but six legs, are pale brown in color and about the size of a pin head, but are otherwise like their parents. They are most abundant in Panama during the dry season, especially in March, and are most numerous in places where cattle and horses are pastured, or where large game is abundant. After filling with blood, usually in a week or less, the young ticks drop off to shed their skin and become nymphs. The nymphs 1/6 of an inch long, and look like the adult female. They also attach themselves to passing men or animals, feed and drop off to shed their skins and change into adults.

The bites of all sizes of ticks are exceedingly irritating and itchy, though they affect some people less than others. Scratching the bites only makes them worse and often leads to infection. To avoid this they should be painted with iodine. During a trip in the bush during the dry season, it is a good idea to cut a small limber switch and switch off one's clothing from time to time. This dislodges the majority of small ticks before they can get through one's clothes. A small piece of beeswax or cobbler's wax softened with paraffin until it is soft and pliable may be pressed onto any ticks seen crawling on the body. They will become imbedded in the wax. A lighted cigarette held near or lightly touched to the tick will kill it before the skin or clothes are burned. Powdered sulphur placed in the socks or sulphur soap lathered on the legs and allowed to dry also gives some protection. The small young ticks or seed ticks are called "cucucitas", "characas" or "garrapaticas", by the natives, while the large ticks are known as "garrapatas". The Cayenne tick transmits, San Paulo in Brazil, a disease almost identical with Rocky Mountain Spotted Fever, but the disease is not known to be in Panama. Modern insect repellents are effective against ticks, especially if the clothing is treated with repellent.

#### REDBUGS

Redbugs, jiggers, harvest mites or coloradillos are minute, barely visible red or brown tick-like animals which help to make life a burden to people who travel in the Panama bush. They are the six-legged young or larvae of several kinds of eight-legged reddish mites which live in the litter of dead leaves and trash on the ground in the jungle. There are a number of different kinds which bite different animals, but there is at least one kind which attacks man readily. They are most abundant during the rainy season, in heavy jungle and where there are plenty of game animals, but they occur nearly everywhere.



The bite is not at first painful, but soon itches badly, though it generally clears up in a couple of days if not scratched. It easily becomes infected, however, and should be painted with iodine. The redbugs are too small to be easily seen and get through most clothing readily. Powdered sulphur in the socks, or sulphur soap, or some mosquito repellents offer fairly good protection. These mites do not transmit any known disease in Panama, but related species carry several typhus-like diseases in the Orient.

### LICE

Lice, cooties or "piojos", are small flattened six-legged wingless insects which suck blood. A number of different kinds are known, each confined to a single type of animal. Human lice are found only on man, and are the only truly human external parasites. Three kinds are recognized: the head louse, body louse and crab louse. The first two are almost identical in appearance, but the head louse confines its attention to the head, while the body louse roams the rest of the body. Head and body lice are about 1/16 inch long, about twice as long as wide, and widest near the hind end. The crab louse, which prefers the hairy parts of the body, but not the head, is somewhat smaller, as wide as long, and widest in front of the middle. The head louse and crab louse lay small white eggs, or nits, which are glued to the hairs of the head or body, while the body louse usually lays its eggs in the seams of the clothing. The young lice look like the adults, except that they are smaller; they also suck blood. They shed their skins three times to become adults, and the whole life cycle is past on man.

Head and body lice are quite active and will crawl from one person to another while crab lice are more sluggish and need close bodily contact to spread from one person to another. Eggs attached to hairs may drop on clothing, towels and toilet seats, and stick to the clothing of infested persons. Clothing and hats of infested persons also may carry both eggs and lice.

To avoid getting lice, stay away from lousy people, bathe as frequently as possible with hot water and soap, and change your clothes frequently, especially underclothes, being sure the clothes are thoroughly scrubbed with hot water, or boiled. To get rid of head lice, rub the hair with kerosene and olive oil or lard, leave on all night, and thoroughly wash with vinegar and hot water in the morning. Two or even three treatments may be necessary. Shaving the head is quicker but has its drawbacks. Body lice and crab lice may usually be gotten rid of by shaving the body hair, sponging a couple of times with strong (95%) alcohol, and a thorough bath with plenty of strong soap and scrubbing. Infested clothing should be boiled if possible, or dry-cleaned and thoroughly ironed with a hot iron.

Lice are not so abundant in hot countries as they are in cold, but all three kinds occur in Panama. The bites are annoying and very itchy and a heavy infestation of lice will tire a man but from loss of sleep and irritation very quickly. The crab louse does not



seem to carry any disease, but the body and head lice carry typhus fever, trench fever and relapsing fever, all serious diseases especially prevalent in armies, or wherever people are crowded together under unsanitary conditions.

### KISSING BUGS OR CONE-NOSED BUGS

These large insects are known in Panama as "chinchas de monte" (wild or forest bedbugs). At least six kinds occur in Panama, but only three at all common as human bloodsuckers, the others apparently preferring the blood of animals or perhaps birds. They are larger, active, long-legged bugs, from  $\frac{1}{2}$  to an inch or more in length. The head is long and slender with small round eyes and a short beak, bent backwards underneath. Six legs and a pair of rather long feelers are present, and the adults have two pairs of wings, which are folded flat on the back when not in use. The adults are often attracted to lights at night. The young bugs look rather like the adults, but lack wings and are fatter and softer. Of the three more common species in Panama, one (*Triatoma dimidiata*) is largely black, the wings pale yellowish-brown with a small black spot near the base, and the sides of the back on each side of the wings with alternate black and orange patches. It is about an inch to an inch and a quarter long. The second kind (*Panstrongylus geniculatus*) is light yellowish-brown, the legs black with reddish knees and feet. The sides of the back next to the wings have a row of black patches and the belly is marked with several rows of black spots. It is somewhat smaller than the first species, averaging slightly less than an inch long, and the head is shorter and rounder. The third kind (*Rhodnius pallescens*) is perhaps the most common in houses. It is  $\frac{3}{4}$  to  $\frac{7}{8}$  of an inch long, more slender than the other two, and with a long slender head with the feelers placed nearly at its tip. The color is light brown, finely streaked with darker brown, the legs and belly being specked and mottled with various shades of brown.

All three kinds may be found in native houses, where they hide by day in cracks in the walls and furniture, or in the thatched roofs, coming out at night to suck blood from the sleeping inhabitants. These bugs are the carriers of Chagas' disease, or American Trypanosomiasis, a disease related to, but much less serious, than African sleeping sickness. The disease occurs in Panama, but is not apparently very serious except in young children. Dogs, cats, possums and armadillos also have the disease and the bugs very probably get the disease from such animals and transmit it to man. The bite of the bugs is only rarely dangerous, but the bugs almost always defaecate or leave droppings while feeding, and these droppings are highly infective. If they fall on the bite, a scratch on the skin, or if they are accidentally rubbed into the eye, infections may follow.

Since the bugs may be found in the jungle as well as in native houses, and as they can also fly, it is best to sleep in a hammock well protected by a mosquito net when in the bush.



## BEDBUGS

Bedbugs or "chinchas" are small flattened reddish-brown insects about 1/4 inch long. They are rather shiny, have six legs, no wings and a pair of rather long feelers, or antennae, on the head. They live entirely in houses associated with man, on whose blood they feed. Old wooden houses, third-rate hotels, and small coastwise boats are very likely to be infested with them. They hide in cracks in the floor, under peeling paint, and wallpaper, in old mattresses and cracks in beds during the day, and come out at night to bite. The bite is rather painful and leaves an itchy red mark. If the bugs are numerous, sleep is difficult or impossible. As the bugs are not known to transmit disease, they must be classed only as a distinct nuisance. Measures for avoiding them are the same as those listed under soft ticks, whose habits are much the same.

## THE HUMAN BOT-FLY

This insect, called "Gusano del monte" in Panama, is the white grub or larva of a large fly, much like an over-grown blue-beetle fly. The adult female fly does not bite or otherwise molest either people or animals, but may hover about for the purpose of capturing mosquitoes and small sweat flies. These she holds firmly in her legs while hovering, and proceeds to glue firmly upon their bellies a small packet of a dozen or more white cigar-shaped eggs. The mosquito or fly is then released uninjured and apparently but little troubled by the extra load. When the egg-laden insect lights on the body of some warm-blooded animal, the warmth causes the fully formed grub within the egg to drop out, when it quickly burrows into the skin of its host. There it forms at first a small pimple, which, in a few days, begins to itch and prick. If unmolested, the larva grows, forming a large boil which does not heal, but oozes blood and pus. The grub is white, shapped like a long-necked wine bottle at first, but later becoming oval. It is covered with circles of sharp black hooks or spines, so that each time it moves or rolls over, a sharp stabbing pain is felt. If allowed to complete its life cycle, the larva remains in the skin from about 45 to 55 days, when it crawls out, drops to the ground, burrows under leaves and trash and transforms into a hard brown pupa, from which the adult fly emerges in 3 to 4 weeks.

These grubs or warbles are very common in many parts of Panama and people are quite often attacked by them. They also attack many other animals, both wild and domestic, including cattle, dogs, cats, monkeys and agoutis. Horses and mules, for some unknown reason, are very rarely attacked. Infestation in cattle may be very severe, quite often killing the animals.

Any small boil or pimple which neither heals nor comes to a head should be examined carefully with a magnifying glass. If a small hole is visible, a very minutes observation will reveal the grub protruding its hind end to obtain air, or moving about under the hole. It may then be squeezed out in many cases, much as one would squeeze a boil.



It is better, however, to cover the boil with a piece of adhesive plaster for half a day. This smothers the larva and makes it easier to remove. Or a wet dressing of bichloride of mercury may be used to disinfect the wound and kill the larva at the same time. After removal, the wound should be well disinfected with iodine or other antiseptics. Occasionally grubs will get into the head, where they are difficult to remove on account of the tightness of the scalp. In such cases removal by a doctor is best. Where "gusanos" are abundant, it is practically impossible to avoid them, but as the eggs are carried by mosquitoes and small flies, the use of mosquito repellents will probably give considerable protection.

### SAND FLEAS

These small insects, also known as "chigoes", "chiggers" and "niguas" are exceedingly common in many parts of the American tropics, but seem to be rather rare in Panama. The female, before mating, looks like an ordinary small flea, but, after mating, she burrows into the skin, generally on the feet and often under the toenails. Here she swells up to the size of a small pea, forming a hard tender lump under the skin with a small reddish opening in the center through which her eggs are dropped onto the ground. The eggs hatch into a slender grub which lives in the dust under houses and in the cracks of floors, eventually spinning a small cocoon and emerging as a small active adult flea.

Domestic animals, especially hogs, are also attacked, and hogs should be penned or kept away from areas where people walk. Oiling of breeding grounds under houses, etc., should prove effective. The fleas in the feet may be removed by carefully picking away the skin with a needle to expose the sac-like body of the flea, which should be carefully removed, including the imbedded head. The wound should be swabbed with iodine until healing has occurred. If neglected, infection is very likely, and in cases of blood poisoning and lock-jaw have been known to result. Where sand fleas are abundant, shoes should be worn constantly out doors, and the feet gone over carefully each night to detect attached fleas before they have a chance to become deeply imbedded.

### SCORPIONS AND SPIDERS

Scorpions are large lobster-like creatures about two or three inches long. They have eight legs and a pair of big lobster-like claws in front. There is no obvious head, and the body tapers into a long jointed tail as long or longer than the body, at the end of which is a sharp recurved spine, the sting. A number of species occur in Panama, mostly in the jungle, where they live on the ground, under brush, bark, fallen logs and the scaly trunks of palms. One species is unpleasantly common in houses. Scorpion stings, at least in Panama, are painful, but not serious, the effects being much like a wasp sting, but causing little swelling and soon disappearing. Some people complain of numbness of the tongue and difficulty in speaking clearly for a short time after the sting. When living in



the jungle, it is best to shake out clothes and shoes before putting them on, sleep in a hammock, and be careful in gathering fallen branches, etc., for firewood.

There are many kinds of spiders in Panama, some of them of tremendous size, but they are for the most part harmless and inoffensive. The giant Tarantulas, often with a 4 or 5 inch spread across the legs, are gray or black, hairy, and ferocious looking. They live mostly in holes in the ground during the day, coming out at night, and are quite common in Panama. Their food consists mainly of insects, such as roaches and grasshoppers but they will eat small birds, lizards and mice when they can catch them. The poison fangs are two black curved hooks on the underside in front which are connected with large poison sacs. Tarantulas are inoffensive creatures for the most part and seldom attempt to bite unless handled. The bite is quite painful and there may be a good deal of swelling, but symptoms usually subside in a day. The very poisonous black widow spider does not seem to occur in Panama, or if it does, it must be very uncommon, and in no cases of spider bite have been noticed here.

### STINGING CATERPILLARS AND BLISTER BEETLES

The larvae or caterpillars of a number of moths are covered with stinging nettled-like hairs. Some of these sting very severely indeed, the pain in some cases, necessitating the use of sedatives. Others merely cause an intensely itching rash. In either case the symptoms usually pass off in a day or less. It is best to avoid handling any fuzzy or hairy caterpillars, though one usually brushes against them in the bush without even seeing them. A weak ammonia solution is said to relieve the local pain and irritation, though no treatment is usually necessary unless the eyes are involved.

Certain small active metallic blue beetles with orange tails are not rare at certain seasons in Panama. They fly actively and are attracted to lights. If handled roughly or crushed on the skin, they exude an extremely caustic and vesicating substance which will raise painful blisters on the skin. If fingers, which have crushed one of these beetles, are rubbed in the eyes, the results may be quite serious; great pain and swelling and even temporary blindness. The effects of crushing the beetles on the skin are not immediately felt, the blisters not appearing until 18 to 24 hours later. Open sores result from the breaking down of the blisters, and these may persist for several weeks, leaving a permanent scar. Washing with strong soap and water before the blisters appear, may remove the poison. After blisters form, they should be pricked and covered with an antiseptic dressing to prevent secondary infection.

### WASPS

The jungles of Panama are well supplied with wasps and hornets of many kinds, but, if one is on the lookout for them and spots their nests, he can generally avoid being stung. The largest and most vicious kind is a large bluish black wasp that builds its nest on the trunks of trees. The nest is made of a kind of paper, is



built flat against the tree trunk, generally under a large branch, and is often evenly ribbed and rigid like a washboard. The wasps generally give warning by drumming on the hollow nest, giving a loud roaring or humming, if one approaches too close. The stings of this wasp are very severe. Many other kinds build round, hair-shaped or bottle-shaped nests suspended from branches or vines, and others nest in hollow trees or branches. When cutting one's way through brush, it is often hard to avoid disturbing nests that may be attached to some vine and hidden in the leaves. Many kinds of smaller wasps build little nests under leaves, but their colonies are small and the wasps timid. A large brown wasp is very common around houses and sheds, where it builds long, hanging combs, like honeycombs, only made of paper. When entering abandoned houses, one should always look out for these. They occur in the jungle also, but more rarely, building their nests on the undersides of large branches, and under overhanging rock ledges. Wasps are known as "Afispas" in Panama.

### ANTS

Ants are everywhere in the Tropics, and quite a few of them sting badly. Some very large kinds occur, reaching nearly an inch in length. They are black, live in nests in the ground and sting as badly as any wasp. One of these, the "Tucandeira" of Brazil, which may occur in Panama, stings so severely that two or three stings will put a man to bed with fever. The pain is said to be terrible, and to last a day or more. One of the most common and most annoying ants, especially in brushy or partly cultivated country, is the fire ant. These live in the ground, making nests under trash, brush piles, etc., and are not generally seen unless their nests are disturbed. They are quite small, shiny brown, and very full of fight, swarming all over one in a moment and getting under one's clothing in no time. The large leaf-cutting ants are found everywhere in the jungles, the long files of ants, each carrying a piece of leaf, and travelling along well-beaten trails, are familiar sight to anyone who has been in Panama any length of time. They are inoffensive insects, but will bite severely if the nest is disturbed, the enormous big-headed soldiers being quite capable of drawing blood. The army ants also travel in files, but they are lighter colored, longer-legged and much more active insects. They nest generally in brush piles or under logs, the "nest" being merely a quart or two of ants all clinging together. The nesting place is moved every day or two. These ants both bite and sting severely. Many kinds of ants live in or on various kinds of trees, and one should avoid cutting or even touching these trees, as most of the ants sting badly. The bull-horn acacia, a small tree with feathery leaves, and pairs of large brown thorns is one of the most common offenders. The thorns are hollow, and a small brown ant lives in them, rushing out and fiercely attacking anyone brushing against the tree. This tree or bush is from 5 to 6 feet to 20 feet high, and is common in all parts of Panama. The native name is "cachito". Another common tree, the cecropia, or "guarumo" has a hollow trunk and branches in which another stinging ant is found. The tree is slender, from 5 or 6 feet to 30 feet high, with few branches, smooth bark, parasol or hand-like leaves usually silvery



underneath and with clusters of rough sausage-shaped fruits. It is one of the most common trees in Panama, especially in cut-over land. Quite a number of other trees and shrubs have ants living in them, but most of them are not common enough to be usually noticed, and one experience will usually teach one which trees to avoid.