

Mahouts giving injections

In Thailand it is illegal for anyone other than a veterinarian to give an injection to any animal, including an elephant. But in treating elephants, veterinarians often meet circumstances where having a mahout give injections makes sense. Elephants are far more likely than any other valuable animal to be found in the middle of the jungle or in remote villages. Consequently, veterinarians sometimes treat elephants that, if they are not injected by a mahout, will not be injected at all.

A typical case might be an elephant with an infection easily cleared by ten days of antibiotics given as two injections a day — but the elephant is 90 kilometres away from the veterinarian's office, the last 15 kilometres down a very bad dirt road impassable in the rainy season. The veterinarian cannot stay with the elephant for ten days. The elephant is healthy enough that it does not need a hospital, and it would be risking the animal's health unnecessarily to subject it to the stress of a 10-wheel truck ride and adjusting to strange circumstances. Plus, the owner might not be able to afford to rent the truck.

In such a case, any intelligent person will agree that common sense should take precedence over the law, and that mahouts under a veterinarian's strict supervision should be allowed to give injections. This is particularly so because the real purpose of the law is not to stop people from sticking needles in animals but rather to stop people from giving animals the wrong medicines or giving the wrong dosage.

If a veterinarian trusts a mahout enough to give him syringes and drugs, the mahout should repay that trust by using the drugs exactly as the veterinarian orders: never more, never less. Never decide on your own that an elephant has been healed and so you can stop treatment before the time the veterinarian specified. Ten days is ten days. If you stop too early, the infection might return and be made worse because the elephant has developed a resistance to the drug.

Similarly, never use old medicines. Never think, "Eeeh, I have that medicine left over from Tusker Gaew; I think I'll use it with Tusker Bunrawd." Choosing medicines and dosages on your own is not only illegal, it is not smart. You can end up with a dead elephant.

Never inject medicines except under instructions and orders of a veterinarian. Do use the techniques given below.



Method for giving intramuscular injections

Giving injections is supposed to be done only by veterinarians, because it can be dangerous if the proper method is not used. But sometimes an elephant is so aggressive that only the mahout can approach and therefore he must give the injection, with the veterinarian nearby supervising.

1. Get a new disposable syringe of the right size for the dose of medicine to be given, usually a 50 cc syringe. Prepare an unused, sterile needle, 1.5-3 inches in length, number 14~16 gauge.

2. Choose the place where you will inject, picking an area with muscles. With elephants, use the shoulder muscles if you are on foot. Use the neck muscle if you are mounted. (See page 144 for sites.)

3. Clean the area where you are going to inject with cotton wool soaked in alcohol.



4. Draw the medicine from the bottle into the syringe in the quantity determined by the veterinarian. (See picture.) Expel any air that remains in the syringe.



5. With your clenched fist strike the area to make the animal aware so that it is prepared and is not startled when you insert the needle.

6. Stick the needle in the muscle, up to the base of the needle.

7. Take the filled syringe and connect it with the base of the needle already in the elephant.

8. Before injecting the medicine, pull back the plunger a bit to ensure that the needle is only in muscle and not in a blood vessel. If the needle is in a blood vessel, you will see blood enter the syringe. If you hit a nerve the elephant will writhe or struggle more than usual. If you hit a blood vessel or a nerve, remove the syringe and start over.

9. Inject the medicine entirely. Take the syringe out and then immediately rub the injected area with your hand to help distribute the medicine. Clean the area with alcohol-soaked cotton wool again.

Warning: Some medicines can cause the area to become swollen but this usually soon subsides. The mahout can help to lessen the swelling by using hot compresses or fomentation.

Caring for sick elephants on the ground

Normally elephants sleep four to five hours a day, mostly at night some on the ground and some standing. Elephants sleeping on the ground are very good at sensing when something strange happens nearby, and thus, apart from calves and sick elephants, it is unusual for the mahout or keeper to actually see an elephant sleeping on the ground.

If an elephant is so sick that it cannot rise on its own, the mahout should consult with a veterinarian about how to arrange the position that the elephant has assumed so that it represents the least danger.

- The elephant should be made to lie on one side or the other. A sick elephant should never under any circumstance be allowed to lie couched on its belly because it will be unable to breathe properly and can even suffocate because of pressure placed on the lungs.
- With sick elephants that are resting on their sides, the side should be changed at least twice a day to prevent a build-up of blood on one side [hypostatic congestion].
- If an elephant is on the ground for over one week, bed sores [pressure wounds or sores] are likely to develop. (See page 87.) Good bedding material, such as dried grass or straw, helps prevent pressure sores.



Health conditions caused by humans

There are four major health conditions caused by humans which in extreme cases have the same medical urgency as a real disease: overwork, malnutrition, stress, and heat stroke. (Humans can also be a contributor to a fifth, much less common disease-free health condition, collapse from cold.) All of these conditions can befall wild elephants, but they are rare in nature because wild elephants are free to avoid them. Humans, who can restrain and confine elephants and who can send them to inappropriate places, cause these debilitating conditions to occur far more often than they do in wild elephants.

The first four of these health conditions are very common afflictions amongst domesticated elephants in Thailand and they cause great damage, perhaps as much or more as damage from real diseases. Indeed, many cases of real diseases occur only because human-caused health conditions have so weakened elephants that they become easy prey to disease. The sad part is that with professional management and humane principles of care, all of these conditions are usually easily avoided.

Overwork (Exhaustion)

Overwork is simply working an elephant so hard that it becomes exhausted and its physical health degenerates to the point where it requires medical treatment, at the very least complete rest and improved feeding. Exhaustion can weaken the elephant to the point where its body's immune system weakens and the animal becomes susceptible to real diseases. Overwork, beyond using too much of an elephant's energy, also uses too much of its time, and often much of that time would have been spent feeding. Overwork thus often leads directly to a closely related human-caused health condition, malnutrition from having eaten too little food.

Malnutrition

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Malnutrition is often found in elephants that are working to make money doing piece work, such as elephants giving rides at tourist venues, elephants panhandling in cities, etc. The more hours the elephant is made to work, the more money the people make. The result is that the elephants



are getting insufficient food or that the food they are eating is not as varied as they would get in more natural circumstances. Sometimes elephants get bored with the food given and sometimes they stop eating. Orphaned elephants are very often malnourished. (See page 46.)

Malnutrition comes in two basic forms, although the two can happen at the same time. First, and simplest, is simply not getting enough food. Second is when through eating only one, or only a very few kinds of food, the elephant is deprived of some essential nutrient, such as protein, minerals, a trace element, or something else.

Human-caused malnutrition is rare in Thailand, except perhaps in some old and crippled animals of little economic value, but many overworked elephants in poor condition suffer borderline malnutrition.

Underweight elephants are usually working elephants that have been given insufficient food, although the problem is also found in old elephants with old and inefficient teeth and digestive systems.

For mahouts and owners, the most important thing is to provide the elephant with the best food available and enough time to eat it. Giving the elephant very good food might appear expensive, but in the long term the poor health that results from inadequate food can cost a great deal of money in lost work time and expensive veterinary treatment, and perhaps even the cost of a dead elephant

Clinical signs: The elephant is thin, swollen with fluid under the jaws, listless, has little strength, and the skin is hard and wrinkled.

Treatment:

- Take the elephant off of work and rest it.
- Supplement the animal's diet with nutritious foods such as ripe bananas, unhusked rice, sugarcane, pineapples, and steamed sticky rice.

Give the animal medicinal herbs such as heart-leaved moonseed, or *bawraphet* (*Tinospora tuberculata* Beum.), *masaan* (*Dillenia aurea* Smith.), sticky tamarind, *makham piak* (*Tammarindus indica* Linn.),

- or *phluu chang* (*Cissus quadrangularis* Linn.).
- If there is swelling, apply a hot compress or hot fomentation.

If the condition does not improve, consult a veterinarian for a full diagnosis.

Spasms from a calcium deficiency are usually found in tourism camps where elephants do not get a chance to eat natural mineral salts.



Elephants which are forced to do very hard work with insufficient rest are also often affected, as are elephants made to travel very long distances.

Clinical signs: The elephant has spasms and cannot control its muscles.

Treatment:

Rest the elephant.

- Supplement the food with mineral salt, such as the mineral salt blocks
- given to cattle and water buffalo. Or you can give calcium pills, but you should consult with a veterinarian about the amount to be given daily.

If the condition does not improve, consult a veterinarian.

- **White muscle disease**, which is not encountered very often, is found in newborn elephants born in areas where the soil and vegetation is deficient in selenium. White muscle disease is a condition that is very difficult to treat and thus prevention is much better. If you have a pregnant cow that is thin or in less than perfect health, especially in the last 3-6 months of her pregnancy, consult a veterinarian who can prescribe appropriate food supplements. The mineral selenium is often called for, but because administering it is complicated, it is best done under the supervision of a veterinarian.

Clinical signs: The calf is not able to get to its feet and stand after birth. Most such calves die within two weeks.

Treatment:

In the last 3-6 months of pregnancy consult a veterinarian.

- *Consult a veterinarian immediately.*
- **Lack of mother's milk in orphaned calves** means that they often die because they get diarrhoea from germs introduced in preparing powdered milk. Another cause of diarrhoea and often death is because the wrong kind of milk is given, such as powdered cow's milk, which many calves cannot digest properly. The best answer is to buy a special infant formula (Prosobee, for example) which is not based on milk.

Clinical signs: The calf does not develop normally, shows stunted growth, suffers diarrhoea often, has coarse and wrinkled skin, and has soft bones.

Treatment: Feed the same as other orphans. (See page 46.)



Stress is often the cause for other illnesses and conditions. In elephants, stress often arises when elephants are overworked, when elephants are put to unusual or unnatural work, when elephants have not had enough to eat, are in too hot a place, are in an environment that is too noisy or too confined, when people are moving around in a disorderly fashion, etc. Getting a new mahout often causes stress.

Clinical signs: Generally, the elephant does not show clear, easily readable signs of stress, but usually there are indicators such as when the elephant is chained, the elephant sways its head and body regularly, often increasing in speed. Some elephants will take their tethering chain and rhythmically strike it against the tree it is tied to or even against its own tusks. In some situations where nothing seems out of the normal and the elephant has been behaving well, the elephant suddenly becomes “crazy” [*baa*] and dangerous to people. Thus, each mahout must be good at “reading” whether his elephant is happy or unhappy.

It is also important to consider the other elephants nearby. Sometimes an elephant will become upset just because it is too near an elephant it does not like or it fears.

When elephants showing such conditions are not properly cared for, when the ultimate causes are allowed to occur, they are susceptible to conditions such as constipation, not eating, exhaustion, etc.

Treatment: Use the elephant only for inappropriate work. Take care of the elephant like a friend taking care of a friend. Do whatever is needed to keep the elephant from developing stress. Do not keep elephants, especially young elephants and female elephants, in isolation.

Advice to camp owners: If an elephant is out of condition in a way hard to explain by physical causes, consider changing mahouts or assigning a highly experienced mahout to observe the situation.

Heat stroke

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Heat stroke [heat stress] is found in elephants that have been worked very hard or made to walk long distances in hot direct sunlight. Heat stroke is also common in elephants that have been given insufficient food and rest.



Clinical signs:

- The elephant has a dazed look and cloudy eyes.
- The elephant breathes hoarsely in rapid succession.
- Usually the elephant will walk with a stagger and sometimes will collapse to the ground unconscious; if left untreated, the elephant can die.

Treatment:

- Prevention is best. Take care of the elephant with love: feed it well, rest it, and don't work it beyond its strength or under a hot sun.
- If it is possible, walk the elephant to a shady place; if that is not possible, build some sort of shade over it.
- Pour water over the elephant's entire body, but most especially the ears.
- Give the elephant only small amounts of water, because drinking too much at one time can obstruct breathing, even to the point of death.
- *If the condition does not improve, consult a veterinarian.*
- Any elephant that has suffered heat stroke should be given two or three days of rest after recovering.

Collapse from cold

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Elephants collapsing from cold are quite common in the cool season, especially in the North. Collapses occur in all cold weather but especially when it is both cold and wet. The best form of prevention is to keep all animals under observation and be ready to treat affected elephants as below.

Most cases are elephants that are old, ill, thin, or just not strong. Also particularly vulnerable are elephants that are under stress or that have just moved from a warmer area. Elephants in any of these categories should be observed especially carefully.

Clinical signs:

- Collapse from cold usually is in the middle of the night or near dawn.
- The elephant will tremble over its whole body, and especially the skin will continuously twitch or tremble.
- The end of the trunk, the lips, and other soft tissue is very pale.
- If the elephant is not helped, it is likely to suffer regular spasms, a sign that it is soon to die.



Treatment:

- Remove hobbles.
- If the elephant is on the ground, try to get it to its feet, although do not rush it.
- Feed the elephant with highly nutritious food such as ripe bananas and sugarcane. Warm unhusked rice, wrapped in banana leaves or the like, is particularly good and will usually be eaten even by elephants on the ground.
- Relieve the elephant's cold by building fires alongside where it is lying down. (If a calf, be sure to have somebody watch over it continually.)
- Try to find a nearby place which is well protected from the wind, such as a tall building, a 10-wheel truck, a tall rock or whatever. Even the slightest breeze will blow away some of the elephant's body heat.
- *If the elephant does not improve, consult a veterinarian for treatment.*

All elephants that have suffered a collapse from cold should be given complete rest (about 1-2 weeks).

Wounds

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Wounds are very common with elephants. If you see an elephant with no wounds or scars, you know that the elephant has an excellent, caring mahout.

Treating wounds

Wounds, whether open wounds or wounds about to become open, can easily become infected. Infected wounds can in turn lead to systemic infections that are extremely dangerous to the elephant. Therefore, when following up on treating a wound it is best if the elephant is kept in a stable with an easily cleaned concrete floor so that the elephant can not blow unclean substances such as dung or dirt into the wound. If there is no stable nearby, then the area where the elephant is chained should be very carefully cleaned so there is no dung or droppings from other animals.



Stanching bleeding

Being able to stop bleeding is of the highest importance when elephants have open, bleeding wounds. Bleeding can be stopped using several easy techniques. You can select just one method, or use any or all of them, but generally you should try them in the order given below.

After the bleeding has stopped or if the bleeding does not stop, call a veterinarian.

- Use a clean, boiled cloth to press against the wound or to stuff into a deep wound with strength for about five minutes until the blood stops. If the first cloth you use becomes soaked in blood, apply another clean cloth on top of it rather than removing the first one.
- If the bleeding is occurring on the legs or tail and cannot be controlled with pressure, a rope or cord can be used as a tourniquet. The tourniquet should be applied above the area that is bleeding. Never apply a tourniquet for more than five minutes; if upon release of the tourniquet blood still flows appreciably, then tighten it again or apply pressure again. (Do not use rope that is too small because it can cut into the skin.)
- Take a knife or a spade [*siam*, a very thin Thai shovel] that is clean, put it in a fire until very hot and then press it against the bleeding wound until the flow stops.
- After the rapid bleeding has stopped, use the stalks and tips of the *saab seua* grass (*Eupatorium odoratum* Linn.), squeezing it into a gelatinous mix and applying it to the wound until the bleeding stops.

Wound cleaning materials

When cleaning fresh wounds, infected wounds and lanced abscesses, the cleaning material used must be as free from germs as possible. There are three main choices: a clean cloth, cotton wool, and sterile gauze (such as used in hospitals). Mahouts treating wounds should know the characteristics of each.

When cleaning a specific wound, the mahout should consult with and strictly follow the instructions of a veterinarian.

1. Clean cloths, uncoloured, are easily available and cheap. Usually they are used for cleaning around wounds or pressing against or stuffing



into wounds to stop bleeding in emergencies. Such cloths should be boiled for at least 15 minutes and hung to dry and then stored in a plastic bag. If stored for long, they should be boiled again before use.

2. Cotton wool is very cheap and also very easy to find. When used to clean wounds it should be used only with water containing an antiseptic and used only under the instructions of a veterinarian

3. Sterile gauze is used normally only at an elephant hospital or under the instructions of a veterinarian.

Cleaning fresh infected wounds

1. With clean water, wash all dirt, mud, and foreign matter away from the wound. If deep, then use water pressure, such as water from a garden hose. Search for and remove any foreign bodies. Wash the wound with Povidone-iodine 1% (diluted to 1:20 solution).

2. Dry the water off the surrounding area and inside the wound with a clean cloth or gauze. If the wound is deep, use cotton buds.

3. Wipe the area with cotton wool or gauze soaked in alcohol.

4. Wipe the wound with cotton wool or gauze dipped in undiluted Povidone-iodine 1% or tincture of iodine. If a deep hole use cotton buds.

5. Apply an anti-insect powder to the skin around the wound.

Cleaning chronic infected wounds (See photograph, page 139.)

1. With clean water, wash all dirt, mud, foreign matter and pus away from the wound and the surrounding area. Then wash with hydrogen peroxide once a day for two or three days until all of the pus is gone.

2. Leave the hydrogen peroxide for about half a minute. Rinse the wound with clean water until all of the hydrogen peroxide is cleared away. Then wipe the inside of the wound with a clean cloth.

3. Disinfect the area surrounding the wound by wiping with cotton wool or gauze soaked in alcohol.

4. Use cotton wool or gauze soaked in “yellow medicine” [*yaa leuang*, Acriflavin] to wipe the wound. If the wound is deep, use cotton buds. In big wounds, use an antibiotic ointment such as Bactacin. The ointment will help promote tissue growth and control infection.

5. Sprinkle anti-insect powder all over the area of the wound.



Hot and cold applications

Hot and cold applications are used to reduce swelling, alleviate pain, and oedema; heat and cold are the operative agents.

Cold compresses: Take ice and wrap it in a clean cloth, and then press it over the affected area. Use cold compresses within the first 24 hours after an injury or condition. Cold applications are good for acute sprains when these involve lameness, pain, heat, and swelling.

Massage with Muay Oil or other analgesic balms. Rub over the area that is swollen or painful, using the palm of your hand. It is best not to use your fingers to press or massage. Treat two or three times a day.

Hot compresses: Take a brick, a stone, a banana tree stalk, or a bundle of the stalks of the crinum lily (*Crinum asiaticum* Linn.) and leave it in a fire until it is hot, and then wrap it in a clean cloth. Another method is to put hot water in a hot water bottle and apply it to the affected area. Hot compresses should be used after the condition has existed for 24 hours or more.

Fomentation: Using a mop-like device to ‘swat’ hot water, usually mixed with medicinal herbs, is a common traditional technique in Northern Thailand. The best way to learn this technique is to consult with an expert mahout.

Types of wounds

Wounds can be divided into the following types:

1. Abrasions occur when elephants rub up against trees and boulders until wounds appear. Abrasions are most common on the sides, the head, the feet and the rump. Abrasions often begin when elephants alleviate itching caused by burrowing insects or by small skin wounds.

Treatment:

- Letting elephants ‘play’ with dirt and mud helps to prevent the problem of elephants rubbing against trees and boulders.
- Apply an antibiotic ointment such as Bactacin with an insect repellent such as Negasunt to abraded areas to keep them from expanding.

Warning: When allowing elephants to ‘play’ with dirt and mud, make sure it is not contaminated with urine or dung.



2. Blunt-edge wounds [contusions] such as being struck with the back of a knife, back of a hook, or by a wooden implement are common. They usually occur around the head, sides, back, and ankle joints. The affected area is bruised and sometimes very swollen. If you squeeze such wounds, they are soft. If left untreated, strike wounds will often harden and develop into internal [subcutaneous] abscesses.

Treatment:

- Cease any more striking in the affected area.
- Apply a hot compress or do fomentation on the wound daily.
- *If the wound does not improve, consult a veterinarian.*

3. Slice wounds, such as from a knife or a spear thrust, are usually found on the head, trunk, or the ankles. Sharp-edge wounds are usually long or wide but not deep. Normally, there is not much bleeding.

Treatment:

- Take the elephant to a shady, dry, and quiet place.
- Stop the bleeding with a clean cloth or cotton wool.
- Wash the area around the wound with clean water or Povidone-iodine 1% and wipe it dry with a clean cloth or cotton wool.
- Clean the inside of the wound with a cloth soaked in Betadine or Povidone-iodine 1%. Dust the wound with insect repellent powder.

4. Puncture wounds, being pierced by a foreign object such as a nail, wire, a glass shard, or a sharp stone, are usually on the footpad. Often the elephant will limp. The wound can be shallow or deep. There might be bleeding but usually not very much. Puncture wounds can easily become infected with tetanus. With a large blade such as a machete the wound will be wide, deep and bleed copiously.

Treatment:

- Take the elephant to a shady, dry, and quiet place.
- Wash the foot (or wound) with clean water in order to inspect the sole of the foot
- If the foreign object is still there, pull it out.
- Clean the area around the wound with Povidone-iodine 1%.
- Smear the wound with antibiotic cream or ointment because that will stay longer than other types
- *If the blood does not stop flowing, seek out a veterinarian.*



5. Gunshot wounds are usually found on the trunk and the legs, particularly the feet. You can see the bullet or pellet hole, often with flowing blood. Usually the wound is swollen.

Treatment:

- *If the wound is in a critical area such as the forehead, chest, barrel or major blood vessels, quickly bring a veterinarian.*
- If the wound is in a non-critical area, such as the leg, and the slug or pellet is small, take the elephant to a shady, clean and quiet area.
- Use a clean cloth or cotton wool to stanch the bleeding.
- Wash or wipe the wound with clean, boiled water.
- Clean the wound with Povidone-iodine 1%.
- Get a veterinarian to take an X-ray to determine the location of the slug or pellet and to extend further treatment.

6. Bites from being attacked by another animal, such as an elephant [on tail] or a dog usually occur on the tail or legs. (Snake bite is covered on page 93.)

Treatment:

- Take the elephant to a quiet place, so as to dissipate the fear.
- If there is much bleeding, stanch the wound by pressing with cotton wool or a clean cloth.
- Clean around the wound with clean water and dry it with cotton wool or a clean cloth.
- Clean with tincture of iodine, Betadine or Povidone-iodine 1%.
- If the bite is on the tail, firmly wrap a clean cloth around it and hold the tail still until the bleeding stops.
- *Consult with a veterinarian.*

Warning: If an elephant is bitten by any animal, but especially a dog, it could contract rabies. (See page 133.)

7. Pressure wounds are caused by hard pressure, such as from a logging harness breast band, a too tight saddle girth, or from lying too long on the ground, such as a sick elephant. Pressure wounds most frequently occur at joints, bone protrusions, cheek bones, and on the back from logging or saddle harness. The wound is an ulcer with a thick edge and sometimes has pus; if left untreated, it is likely to turn into a “pus hole” [*phroong nawng* or fistula]. (See photographs, page 137.)



Treatment:

- Solve the problem that is causing the condition.
- Take the elephant to a shady, dry and quiet place.
- Use clean water to wash off any dirt or other material.
- Smear the wound with ‘yellow medicine’ [*yaa leuang*, Acriflavin] or with an antibiotic ointment. Apply insect repellent powder.
- If the wound is large, take the elephant off of work.
- *If the condition is severe or does not respond to treatment, consult a veterinarian.*

8. Burns are often found at the end of the trunk, on the back, and legs. Burns can be broken down into four main types: tree sap burns, sunburn, burns from fire or boiling water, and chemical burns.

Warning: Nearly all of this class of wounds are open or can become open, so they are extremely susceptible to secondary infection. Consequently, for convalescence try to find a shelter with a concrete floor so the elephant cannot throw dirt on the wound. If you cannot find a concrete floor, pick a place where there is no residue from dung from elephants or other animals.

Burns from corrosive tree sap of various kinds, such as the papaya plant or the black varnish tree, usually cause the skin to break into a rash and become itchy, but if the condition is not treated it can turn into an infected [septic] wound.

Treatment:

- Determine the kind of plant that did the damage and move the elephant to an area free of that plant.
- Wash the affected area with clean water and then use a clean cloth or use a piece of coconut shell to rub off the sap. Dry the area.
- Apply an antiseptic cream such as Travogen or Caladryl.
- *If the condition does not improve, consult a veterinarian.*

Sunburn comes from overexposure to the sun, often occurring in bulls in musth that are chained in open areas. The sores are swollen, red, and infected. The skin can split open from internal pressure and can slough off in sheets. The flesh can die and pus can form under the skin. The elephant will constantly try to use its trunk to spray water or spread dust over the sores. If not treated, the animal will quit drinking and eating and will die. (For heatstroke, see page 80.)



Treatment:

- Take the elephant to a cool place with good air circulation.
- If the elephant is still in musth or cannot be approached or moved, bring water for the elephant to drink and to spray on itself.
- Clean the wound with clean water, and gently dab it clean.
- Treat the elephant with a burn salve.
- *See a veterinarian immediately.*

Chemicals burns, such as from oil fuels and acids, for example, are common. After exposure to such caustic chemicals, the skin will swell and turn red and often become infected and in the end decay. Most often chemical burns are from liquids that leak from a container kept in the elephant's saddle.

Treatment:

- If the elephant is wearing a saddle and the chemical burn is on the back, take the gear off.
- Take clean water and gently flood the wound clean.
- Take the elephant to a shady, dry, well-ventilated, and quiet place.
- Clean the affected area with water, using cotton wool or a clean cloth and then dry it.
- Smear the affected area with a burn salve or with an antiseptic cream such as Cibis or Fennistil.
- *Consult a veterinarian as soon as possible.*

Burns from fires and from scalding water usually happen to young calves, because the keepers build fires near them at night, especially for orphaned calves. Special precautions should be taken with fires and boiling water around young calves because mahouts often leave them free, unchained or unpenned. If the burns or scalds are large, the elephant is likely to die. Such wounds are often swollen and they are prone to slough off.

Treatment:

- Try to calm the animal, restrain it, and keep it still.
- Take the elephant to a cool, shady, dry place.
- *Consult a veterinarian urgently, but if you must wait for him, first use an anti-infection powder or apply a burn salve.*

While waiting for the veterinarian, give a pain killer every 4 hours; keep the label of the pain killer to show the veterinarian. (For how to give painkillers, see page 72.)



9. Impact wounds come from a strong blow, being struck by a vehicle, a fall, being struck by a log, an accident during a performance, etc. Such wounds are usually found on the legs, shoulder joint, other joints, or on the back. Impact wounds range from bruises and swelling to internal bleeding, external bleeding, and broken and cracked bones.

Treatment: *Consult a veterinarian as quickly as possible.*

10. Wounds from explosives are usually on the front feet and legs. There will be torn skin and tissue. Usually some tissue will die. There is a sooty residue of the explosive over the whole wound.

Treatment: *Consult a veterinarian as quickly as possible.*

Abscesses

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Abscesses come in many kinds, so the easiest way to think of an abscess is as an infection out of control locally. Some abscesses become so bad that they lead to systemic infections of the blood.

Abscesses occur quickly under the skin, in the muscles, and in internal organs. In elephants abscesses usually occur under the skin. Abscesses are often associated with wounds and injuries. Some abscesses start with small wounds that then become larger when the elephant, to ease its irritation, rubs the wound against a tree or a boulder. Sometimes the condition begins with a small abscess but when the abscess erupts, it becomes an infected wound. Sometimes it is hard to tell which came first, the wound or the abscess, because they are so interrelated.

Abscesses start from many causes. A common cause is being regularly struck by the mahout. Another cause is wounds from breast bands from logging harness or from saddle girths that have pressed deeply into the skin for a long time. Some abscesses start where insects have laid eggs and or where medicine has been injected.

The abscesses that are found in elephants can be divided into two main types, acute abscesses and chronic abscesses

Acute abscesses

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Acute abscesses begin very quickly, within two weeks from when a foreign object pierced the skin or an infection occurred. If you press on the abscess, the elephant clearly feels pain. The wound area feels hot.



At the start of the condition, the abscess feels hard but as the abscess 'ripens' it becomes softer and then opens.

Abscesses can begin in deep muscle. In the beginning the elephant will have a fever but the abscess will not be swollen; still, the elephant will not be able to use that organ or to move as normal. About two to four weeks after infection, pus erupts or there is swelling in the surrounding area. Sometimes there is a deep hole leaking pus [fistula].

Treatment:

- If the abscess is on the skin but the "wall" over the abscess has not yet thinned, the wound is not yet "ripe" [*suk*]. Use hot compresses or fomentation two to three times daily. You can also apply tincture of iodine liberally over the area because this can stimulate the abscess to ripen.
- When the abscess is ripe, lance it in the thinnest part.
- Squeeze out all of the pus. Use clean water to wash the inside of the incision. Dry the inside of the abscess. If the abscess has opened on its own, squeeze out all of the pus and clean the wound as above.
- Use hydrogen peroxide to rinse out the last of the pus. Use plain water to rinse out all of the remains of the hydrogen peroxide. Dry the wound with a clean cloth or with cotton wool.
- Clean with Povidone-iodine 1% until the inside is clean
- Apply either an antibiotic cream or powder.
- *If the abscess is very large, or if it is under the skin or deep in tissue, quickly call for a veterinarian.*

Chronic abscesses

ฝีหนองชนิดเรื้อรัง

Chronic abscesses develop very slowly, often over one or two years but sometimes as long as ten years. The walls are very thick and like a thick scar. Sometimes chronic abscesses are called 'cold abscesses' and sometimes they are called "easy abscesses" [*fi sabai*].

Treatment:

- *Call a veterinarian to lance such abscesses because the walls are very thick.*
- If the abscess has opened on its own, lance it to drain pus.
- Clean the abscess with Povidone-iodine 1%.
- Apply either an antibiotic cream or powder.



Elephants are liable to be poisoned by chemicals either through contact on the skin or through ingestion. In the past, elephants were often bitten by snakes, but today elephants are more likely to be affected by toxic chemicals in insecticides and herbicides, such as Diquat, Paraquat, etc. Consequently, the mahout must be very careful about where he takes his elephant to keep and to eat.

Naturally-occurring substances

Toxic metals are found in earth, rock, and in some water sources. Nitrates that are suffused in some water sources can, if a sufficient quantity is drunk, kill elephants. Or elephants can absorb metallic toxins in food, such as minerals found in red dirt, selenium for example.

Clinical signs: Symptoms usually manifest long after ingestion and absorption, which can make it difficult to ascertain the cause. But it is easy to tell the cause when more than one elephant becomes ill at the same time after ingesting the same contaminated food or water, because the condition is most likely to have come from the same source.

Treatment: Consult with a veterinarian and an environmental official to try to diagnose the condition and to analyse the real cause.

Toxins in plants, both by contact and ingestion, such as, for example, cassava, monkey pod (*Samanea saman* Merr.) or velvet bean (*Mucana pruriens* [L.] DC.). Often the symptoms are obscure. The possible presence of toxic plants is something that the mahout should think about both before taking his elephant to eat in a particular place. If the elephant shows signs of poisoning, it should be taken off of work immediately and a veterinarian should be called.

Man-made toxins (Insecticides, herbicides, and industrial waste)

Insecticides can be contacted either by ingestion or through the skin. The most important are the organophosphates (such as Malathion, Parathion) and the organochlorines (such as DDT, Aldrin, carbamate insecticides, etc.). Poisoning is often found in elephants wandering in cities where they eat many contaminated cucumbers, guavas, etc.



Clinical signs: Insecticides affect the central nervous system, causing nervousness and apprehension and suppressing breathing. These toxins can cause salivation, vomiting, colic, diarrhoea, tremors of the skin, convulsions, laying on the ground and ultimately death. The elephant will begin to show signs within about 12 hours after having ingested the toxin. Nervous signs can be delayed for up to two days.

Treatment:

- If you know the cause, keep the container or the label to aid in prescribing treatment.
- *Call a veterinarian immediately.*

Herbicides like Diquat and Paraquat are often ingested when, after the harvest, elephants are let free to feed in the villagers' fields and paddies. Animals are sometimes poisoned after drinking from contaminated containers.

Clinical signs: Affects the central nervous system and causes the elephant to vomit, salivate, have diarrhoea, tremble and die.

Treatment:

- If you know the chemical, keep the container or the label to aid in prescribing treatment.
- *Call a veterinarian immediately.*

Industrial wastes that have contaminated grass and water frequently affect elephants that wander in cities.

Three chemicals in the environment are a particular danger to elephants. Arsenic will cause elephants to have great stomach pain, to go the ground, and to ultimately die. Strychnine causes elephants to suffer convulsions. Lead causes elephants, for about three days, to walk unevenly, to salivate, and to have glazed eyes; elephants will become excited, tensing and suffering convulsions.

Treatment: *Call a veterinarian immediately.*

Snake bite is most often suffered by calves.

Clinical signs:

- Symptoms vary according to the type of snake.
- Cobras and king cobras will leave two large fang marks and two rows of small teeth marks. The elephant will show signs of the central nervous system being affected, particularly paralysis, and the animal will often die. The above conditions occur within 1-2 hours of being bitten.



- Russell's pit vipers and kraits will leave two fang marks that are larger and deeper than a cobra's or a king cobra's fangs. The venom affects the blood and causes swelling and severe local tissue damage from which a dark bloody fluid may ooze. The elephant is likely to die from kidney failure.
- If stung by a wasp or scorpion or bitten by centipede the elephant will not exhibit a severe condition but there will be some swelling and some infection in the area of the wound.

Treatment:

- Knowing the type of snake will make determining the course of treatment easier but usually there is only the bite marks with the snake never seen.
- Take the elephant to a shady place.
- Wash the wound with copious clean water and also with *dang thap tim* [potassium permanganate solution].
- *Then, as quickly as possibly, bring a veterinarian.*
- In the case of insect bites, apply an anti-infection cream in the area of the bite or sting.

Note: Old-time mahouts say that in cases of snakebite, besides looking for fang puncture marks, you should also check to see if hairs can be pulled out easier than usual.

Advice to camp managers: Very often when an elephant has died quickly with no immediately apparent cause, the mahout will say that it is from snakebite, because that is a very easy answer. But often the real reason is that the mahout hasn't moved the elephant to new feeding sites, has chained the elephant where there is no water, and the elephant has actually died for lack of food or water.

THE OUTSIDE OF THE ELEPHANT

Skin

The skin of the Asian elephant is 1-3.5 centimetres thick. The skin on the back and the haunches is the thickest and the skin behind the ears is the thinnest. The skin is important in controlling temperature, especially dissipating heat. The elephant's skin is so wrinkly partly to increase surface area to shed warmth from its body. Oddly, the skin has



no sweat glands except for those right above the elephant's toenails. Healthy skin plays a great part in an elephant's vitality. Elephants love to roll in mud and to throw dirt over themselves, both of which protect against sun and insects. They also love to bathe for long periods, and bathing is a good opportunity for the mahout to look for anything unusual with the skin, such as wounds, abscesses and parasites.

Papilloma

๒๓๑



Papilloma warts, which are caused by a virus, are not found very frequently in elephants. Papilloma warts most often arise in calves, particularly those that have not drunk mother's milk regularly since birth, the lack of which causes the calf to be deficient in antibodies against the virus.

The warts are characteristically like round balls of flesh, much like warts in people but larger. Warts are often found on the trunk, from the tip to the base. Mostly you find only one wart, but sometimes there are many.

Clinical signs:

- In some cases where there are many warts on the trunk, the elephant will only be able to use its trunk clumsily. Sometimes the elephant will be noticeably irritated but still be able to use its trunk normally to gather grass and to drink water.
- Warts develop quickly, growing in size and in number in 2-4 weeks, and they often fall off and disappear on their own.



Treatment:

- If papilloma warts are found where they do not interfere with the life process or where there are not enough to be very ugly, leave them alone because the warts are likely to fall off on their own.
- If the elephant shows irritation or if the warts interfere with feeding, consult a veterinarian and he will twist them off completely. Never use a knife or scissors to cut off warts because that will cause bleeding; also, if cut, there will be a new wart in about a day's time. (Like weeds, these warts have roots buried in the skin.)
- If the wart falls off by itself, wash the base that remains with Povidone-iodine 1% diluted to a 1:20 solution or use an antibiotic spray or apply Furazone ointment or Acriflavin. Then call a veterinarian.

Fungus on the skin

โรคเชื้อราที่ผิวหนัง

In the old days, there were basically no fungal infections on the skin because elephants were kept in appropriate, natural conditions and not overworked, which is quite different from today.

Fungal infections are often found on elephants fed insufficient food, or poor food, or on elephants that have been worked to the point of exhaustion. The fungi are found everywhere in the environment. Infection often comes when elephants are kept in a very confined space.

Path of infection:

- Through an elephant that already has the disease
- Through fungi spores found in food and the soil

Clinical signs:

The fungus first appears as specks, often starting as small grey-white spots on the back of the ears or on the throat. If left untreated, these spots will enlarge into blotches and can spread all over the body. Some cases have distinct blotches of bright pink with a diameter of up to 10 centimetres. (The pink is not the colour of the fungus but rather the colour of the skin after the fungus has caused depigmentation.) These blotches cause irritation and itching in the elephant, so it will often scratch the infected area or rub it against a tree until wounds form. The condition can effect eating and sleeping, ultimately leading to secondary illnesses.

See photographs, pages 139-140.



Treatment:

- Separate the infected elephant from other elephants.
- Take the elephant off of work or put it on very light work.
- Provide sufficient food of high nutritional value such as bananas, unhusked rice, and fresh grass.
- With newly infected elephants, the condition can be alleviated by smearing an anti-fungal ointment such as Travogen ointment or Ketoconazole, which can be bought in any pharmacy. Anti-fungal ointments are expensive, often too expensive for treating full-blown cases. The money is well-spent, however, for cases just beginning because eliminating the fungus early can alleviate the need for injected drugs, which are toxic in overdoses and thus very dangerous.
- Smear the infected skin with olive oil [“Thai olive” or *makawk*], which will keep the skin moist and slow the spread of the infection.
- *If the condition has not improved within a month, consult a veterinarian to diagnose and treat the disease.*

Warning: Fungal infections require a methodical and often very long course of treatment. Very often the condition proves drug resistant, and thus treatment can become very expensive. Therefore, if you have an elephant that is just starting to show the signs, even a very little bit, treat it as quickly as possible. In the end you will save much money.

Ventral oedema

ลำบอง

Ventral oedema is a swelling caused by water [fluid] collecting in the tissues under the skin on the elephant’s under surface. Ventral oedema is a sign of something wrong inside the elephant’s body. It is often found in elephants that have been fed an unbalanced diet, such as eating too many banana tree stalks. Ventral oedema is also common in elephants under stress or with low protein levels in the blood.

Clinical signs: A watery swelling on the under side of the body, the throat or the belly or the sex organ or any combination thereof.

Treatment:

- Prevent or correct the stressors that are likely causes of ventral oedema.
- Apply hot fomentation or hot compresses daily to the affected area.
- *If the condition does not improve, consult a veterinarian.*



Note to camp managers: Ventral oedema is a condition that manifests itself externally but indicates some internal abnormality. There are many possible causes. Beyond causes described above, oedema can be caused by liver flukes, renal failure, heart disease, tuberculosis, or even simply an upset digestive tract. Thus, only a veterinarian can diagnose the real cause in order to alleviate or treat the condition.

External parasites

พยาธิภายนอก

Most Thai elephants still spend their lives in nature and therefore they often come into contact with external parasites. The parasites that are most often found on elephants are gad flies, fleas, hair lice, lice, and bot flies. External parasites harm elephants in various ways:

- Irritated adults will eat less, and calves will grow slowly.
- Some parasites suck blood, which weakens animals and leaves them susceptible to disease.
- Some parasites feed on flesh and skin.
- Many flies and some ticks carry disease that they transmit when they bite and suck blood.

Warning: If one elephant is infested with ticks, lice or fleas, you can assume that all other nearby elephants are also infested.

The best way to prevent or lessen external parasites is to maintain cleanliness by careful collection and disposal of dung and urine. It is essential to cleanse the elephant's body carefully every day by using half of a coconut shell to scrape the elephant on a daily basis.

Gad flies

ด้วงแมลงวันป่า

Gad flies [*duang* or *malaeng wan pa*] lay their eggs on the skin, where they become larvae. When mature, they bore out and fall to and enter the earth, where they pupate to become adult gad flies.

Clinical signs: The elephant's skin has many bumps the size of soy beans, particularly on the sides, hips, and belly. The elephant is irritated, which it shows by rubbing against trees and rocks. Some of the bumps break open and turn into nasty sores as the larvae emerge, especially in the area of the belly. If you dig into one of the bumps, you will find a white worm [larva], with both the 'mouth' and the rear end being black.



Treatment:

- Use the sea bean liana (*Entada pursaetha* DC.). Cut it into lengths, pulverize it, and then dip it in water and rub it over the affected areas until it turns frothy. Let it dry on its own. Treat in this way every day until the bumps disappear.
- Spray a preventative medicine such as Neguvon, Diclovos, or Arsuntol, against the flies laying their eggs. These medicines should be used with great care, especially that they do not enter the eyes, trunk, mouth, or any open wounds. After spraying, let the medicine dry on its own and wait for about half a day before bathing.
- Allow the elephant to wallow or daub itself with mud.
- Give a drug of the Ivermectin group. (See page 116.)
- *If not cleared in 2-4 weeks, consult a veterinarian*

Warning: Insecticides are dangerous to elephants and people and should not be used as a preventative. Spraying works only temporarily.

Fleas and mites on the tail

หมัด, ไรที่หางช้าง

Fleas and hair lice are the primary cause of tail hair dropping out and of sores at the end of the tail.

Clinical signs: The elephant will swing and rub its tail against trees, rocks, posts, etc., and against its own body. Hairs will break off and fall out, and this activity often results in open sores.

Treatment:

- To eradicate fleas and hair lice use a medicine against external parasites. Spray a preventative medicine such as Neguvon, Diclovos, or Arsuntol (leave the medicine on as long as the label says), or scrub with the sea bean liana (*Entada pursaetha* DC.).
- Wash the wound and let the lice or fleas fall off.
- Use a medicine in the group of gentian violet with an antibiotic such as Oxytetracycline, spraying it each day until the wound has healed or apply an anti-fly powder such as Negasunt.

Hair lice

เหาช้าง

Hair lice [*Haematomyzus elephantis*] irritate elephants so much that some become exhausted. Some elephants become bad-tempered.



Clinical signs: The elephant will show indications of itching. If you look very closely, you will notice lice as small red or brown lumps the size of the head of pin. The lumps will be found in groups in creases in the elephant's skin. Lice are mostly found in the soft tissue behind the ears, at the end of the trunk, the reproductive organs, and the tail. Elephants will often rub up against trees, and many are so constantly agitated that they get no rest and become exhausted and finally contract a secondary disease.

Treatment:

- Allow the elephant to play in dirt and mud.
- Wash the elephant very carefully and then scrub the elephant's body with the sea bean liana (*Entada pursaetha* DC.) until the liquid becomes sudsy. Leave the fluid to dry naturally and to eradicate the insects.
- Spray the area with a medicine against external parasites such Néguvon or Arsuntol.
- Give, under direction of a veterinarian, a medicine belonging to the Ivermectin group. (See page 116.)
- *If the elephant's condition does not improve in 2-4 weeks, consult a veterinarian.*

Tabanus flies

เห็บอับ

Tabanus flies are blood suckers. They are extremely aggravating to elephants and they can be transmitters of contagious diseases such as anthrax and trypanosomiasis (Surra).

Clinical signs: The elephant will move continuously to keep the flies away.

Treatment:

- Bathe every bit of the elephant carefully, scrubbing with a piece of dried coconut shell each day.
- Allow the elephant to "play" [*len*] in dirt and mud.
- Spray with a medicine against external parasites such Néguvon or Arsuntol
- *If the elephant's condition does not improve in 2-4 weeks, consult a veterinarian.*



Head

Eyes

The elephant's eyes are small, about the size of a horse, and nearly all books say that its vision is not very efficient compared to its hearing and smell. Still, the elephant's ability to move around quite well in dim moonlight suggests their eyes are well adapted for low light levels. Elephants do not like it when it is totally dark or very bright, rather preferring the light at dawn and at dusk or in shady areas during the day.

Healthy elephant eyes are clear and are well lubricated.

Eye conditions are a big problem, whether elephants are kept in the forest or are wandering city streets. Eye problems tend to arise very quickly and it is best to see a veterinarian for all eye problems.

The most common problems are conjunctivitis and infected cornea.

Conjunctivitis comes from irritation caused by dust, wind (especially from being trucked), smoke, leaves, etc. (See photograph, page 138.)

Clinical signs: The elephant will have copiously flowing tears, red eyes, swelling and signs of infection. The eyes blink frequently and most elephants will use their trunk to rub the eyes. In some cases there will be a yellow discharge.

Treatment:

- Take the elephant to a shady place.
- Wash the eye with a cleaning fluid or boric acid.
- Dry the eye and then apply eye drop medicine or apply an eye ointment. (See page 103.) If you use antibiotic eye drops you should apply the medicine every hour all day long. If you use eye ointment, apply it twice a day, morning and evening. (It is best if a veterinarian chooses which kind of medicine.)
- In situations where you do not have a medicine specific for eyes, take a stem from the red castor oil plant (*Ricinus communis* Linn.) and heat it in a fire; then blow the smoke inside the stem into the eye(s). Or take the ground-up shell from a land snail and mix it with leaves from thatch grass (*Imperata cylindrica* Beauv.) and heat it over a fire until it is charred; then take a drinking straw and blow the smoke into the elephant's eyes. This gives good results.
- *If the condition does not improve, see a veterinarian.*



Infected cornea [keratitis] can come from disease but usually proceeds from mechanical injury. Infected corneas cause many elephants to go blind. Keratitis can be divided into four types.

Treatment: All four types of keratitis are treated exactly the same as conjunctivitis.

1. Infected cornea with highly visible blood vessels [superficial keratitis with vascularization] arises from irritation and a subsequent infected conjunctiva that has been left untreated.

Clinical signs: The eyes are red with copious tears. Blood vessels are seen in the cornea. The elephant rubs its eyes with its trunk.

2. Ulcerated cornea [ulcerative keratitis] comes from the eye being struck hard, or pierced by a thorn, twig, etc., until there is a wound. The eye becomes opaque and there will be pus. Blindness often follows.

Clinical signs: There is an ulcer on the cornea. Often the eye is opaque. There are copious tears.

3. Infected cornea with an infected eyelid [keratoconjunctivitis] comes from irritation caused by a foreign object (usually a twig, leaf, etc.), smoke, etc.

Clinical signs: There are copious tears. The eyes are red and infected and there is frequent blinking. The elephant rubs its eyes with its trunk. Sometimes there is a yellow discharge.

4. Infected cornea with a puncture [punctate keratitis] often comes from being frequently struck hard on the brow. There is an opening on the cornea, and there is pus from the eye chamber.

Clinical signs: A puncture on the cornea with tissue drooping. Sometimes there is pus. There are copious tears. If the condition is not treated, the eye will become opaque. The elephant may become blind.

Cataracts, lesions of the lens that become opaque, arise from many causes, such as an injury to another part of the eye that spreads to the cornea. Cataracts affect mainly old elephants but malnutrition can cause cataracts at any age. Too much exposure to direct sunlight (or other strong light) can also cause cataracts. Cataracts cause opacity and the elephant will become progressively blind. (See photograph, page 138.)

Clinical signs: The lens is opaque and sometimes becomes hard and dry. Some eyes will exhibit a milky discharge. The central eye can bulge.

Treatment: See a veterinarian.

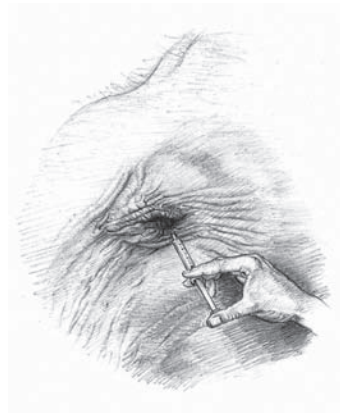


Medicating eyes

The elephant's eyes are very small in proportion to the size of its body. The eye has three lids to protect the eye. When the eye is infected or irritated by a foreign body, the third eye lid becomes very prominent and often red coloured. The mahout should be expert in the following technique.

How to apply liquid eye medicine:

- Take a clean cloth wet with clean water or disinfectant and gently clean the area around the eye.
- Wash your hands very carefully and wipe them dry.
- Using a 3 cc disposable syringe, through the needle draw some medicine from the bottle.
- Remove the needle from the syringe.



- Quickly squirt the eye medicine in the open eye. Do so hourly.
- *Eye ointments should be used as advised by a veterinarian.*

Ear infections

หูอักเสบ

An elephant's ears are a primary indicator of the animal's health. A healthy elephant will constantly, vigorously flap its ears, but an elephant in poor health will do so only very slowly.

Ear infections can be divided into two types, infections of the external ear and infections inside the ear [the auditory canal].



Infections of the external ear [Otitis Externa] and auricle come from two sources.

- The mahout uses his hook to gouge and probe the upper part of the auricle until it becomes infected.
- Lice, ticks or a fungus infect the auricle and the elephant uses a stick or its trunk to rub the area until it becomes infected.

Clinical signs: The auricle is swollen and red. The wound emits pus and a foul smell. The elephant shows pain. If you explore the wound, sometimes there will be maggots.

Treatment:

- Make the elephant couch or stand perfectly still.
- Clean the area surrounding the auricle of the ear with cotton wool soaked in an antiseptic such as Povidone-iodine 1%.
- If there is pus, clean the area around the auricle and the auricle itself with a solution of clean water and hydrogen peroxide (10:1).
- Treat using “yellow medicine” (*yaa leuang*, Acriflavin) or, if there are maggots, use a maggot killer such as Negasunt.
- Do the above every day until the condition is healed.
- *If the condition does not improve, see a veterinarian.*

Infections of the internal ear [Otitis Media] begin with external infections that, if left untreated, spread to the inside. Sometimes germs will enter the ear and an infection will erupt.

Clinical signs: When the elephant lies on its side or if you press the sore ear’s auricle, pus will come out. If you get close to the ear it will have a bad smell.

Treatment: *Consult a veterinarian.*

Trunk

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The elephant’s trunk is a critical organ in the life process. The trunk can be compared to a human’s hand. It plucks grass from the ground and pulls food down from places as high as 4 or 5 meters. The elephant uses the trunk as weapon to defend itself, as a way to communicate with its fellows, to smell, and, of course, to breathe.

The trunk is composed of 40 000 muscle bundles. The trunk has very extensive networks of both blood vessels and nerves. A desirable



elephant will have a trunk with a very thick base, muscular throughout its length, and the end of the trunk must be able to be closed tightly. Thus, any significant injury to the trunk can cause death. Because the trunk is very sensitive, an experienced mahout will therefore use only the tip of his hook in order to control the elephant.

The only conditions that afflict the trunk are papilloma (see page 95) and wounds. There have been unsubstantiated reports from southern Thailand of a condition that sounds similar to floppy trunk disease, a mysterious condition that affects African elephants, leaving the trunk paralyzed and pliable. We would very much appreciate being informed about such cases.

Tusks

งาอักษะ

What we call a tusk is actually an incisor tooth, and not a canine tooth as would be logical. If you read about tusks of Asian elephants in Thai books, you will always read that only males elephants have tusks. If you read just a bit further, though, you will be told that some male elephants [*chang si daw* in Thai], and all female elephants have tusks that are too small to be called tusks and are called *khanai* [tush].

From a medical point of view, all elephants have tusks, with the variation being only in size. It is true that what we call a tusker (*chang phlai*) is more likely to have more problems with its tusks, both because of their size and because they are made to use their tusks to do hard work. Still, any elephant can suffer infected tusks,

The base of the tusks are embedded deeply in the elephant's skull, set in sockets under the eyes. Tusks are very strong and in a mature male elephant grow on average about 17 centimetres a year. A hollow inside the tusk [pulp cavity] contains blood vessels and a nerve. Consequently, before cutting or trimming an elephant's tusks you should know how much is to be cut off in order to not cut the blood vessels and the nerves. Opening the pulp cavity can cause the elephant to die through loss of blood or infection or even through contracting tetanus.

Recommendation to camp managers: When trimming tusks always seek the advice and services of an expert mahout. Because there is so much variation between tusks, never follow any rules for cutting that you read in a book.



Tusk infections are of many kinds:

1. Tusks that have cracked from elephants that habitually “play with their chains,” [*len soo*] that is, try to break them. The tusk can suffer a great deal of impact force.

2. Tusks that wobble because they are loose in their socket come from elephants that “spear” [*thaeng*] the earth or trees for fun. The socket becomes infected.

3. Tusks that are broken or cut so close to the base that the pulp cavity becomes infected. This condition often arises when tusks are cut by ivory thieves.

4. Tusks that have fallen out but the socket is still infected.

Cracked tusks

Clinical signs: The crack may be only near the tip or it may extend up to and into the base. In the latter case, the tissue that covers the base may be swollen. The elephant has copious tears from its eyes if the tusk is infected. If left untreated there will be pus seeping from the cracked tusk and there will be a foul smell.

Treatment:

- If the tusk is cracked or split near the tip, and if it is not severe, quit working the elephant and the condition will heal itself. If the split is bad, it is good to help by binding wire around the tusk and checking for infection and for swelling. After that, consult a veterinarian.
- If the condition is chronic, the tusk is usually infected and should be washed clean with a solution of clean water and Povidone-iodine 1% (mixed 1:20) on a daily basis.
- *Then consult a veterinarian.*

Loose, wobbly tusks

Clinical signs: Foul smelling pus secretes from the tusk base, not the tusk itself. The elephant will regularly blow air or dirt on the area with its trunk. If you move the tusk, the elephant will show pain.

Treatment: Wash the area where there is pus with a solution of clean water and Povidone-iodine 1% (mixed 1:20) on a daily basis. Then consult a veterinarian.



Tusk broken or cut too close to the base

Clinical signs: There is pus in the pulp cavity and the elephant will usually spray dirt with its trunk and use sticks to probe into the cavity. If the tusk is newly broken or cut, there will likely be blood seeping from the tusk.

Treatment:

- In the case of newly broken or cut tusks, if there is bleeding, stanch it with cotton wool or with a clean cloth. (You can also use a green banana to insert and plug the bleeding.) Then wash the cavity with a solution of clean water and Povidone-iodine 1% (mixed 1:20) on a daily basis or after having washed the cavity with clean water, soften a candle over a flame and insert it to block the cavity.
- In tusk cases that are long and chronic, wash away all dirt and pus completely, and then wash the cavity with a solution of clean water and Povidone-iodine 1% (mixed 1:20) on a daily basis. Be very careful to prevent infection by tetanus. Call a veterinarian to inspect the condition and advise.

Empty sockets

Clinical signs: The elephant will use its trunk to blow or stuff dirt into the empty socket. There is likely to be pus.

Treatment:

- Clean the cavity with a solution of clean water and Povidone-iodine 1% (mixed 1:20) on a daily basis.
- *Have a veterinarian inspect the condition.*

Feet and nails

เท้าและเล็บช้าง

Asian elephants usually have between 16 and 20 toenails. The normal elephant has 18 toenails, with 5 in front and 4 in back. The nails are shaped as elongated semicircles, and emerge from the skin spaced apart. The front feet are round while the hind feet are more oval and smaller. The bottom of the elephant foot has a thick footpad (1 –2 centimetres). The ideal footpad has grooves [fissures] in order to prevent the elephant from slipping, much like the treads on a tyre.



Elephant toenails are likely to break, split, and fall off. Without treatment, such conditions will damage the animal's general health. Movement becomes difficult and it is possible the elephant will die.

There are two general causes of problems in feet and toenails:

Internal causes: Sometimes problems arrive from poor nutrition, lack of minerals and certain vitamins. Sometimes problems come from conditions within the animal's own physiology. The elephant's toenails can become thin or brittle and can peel [exfoliate] or crack easily. Elephants can have abnormal or crippled feet from birth or by accident. Movement is made difficult by, for example, stiff legs, stiff joints, sprains, twisted legs, etc. An elephant might drag a leg or stand in an abnormal posture, causing toenails to grow unusually long.

External causes: If the surface where the elephant walks or is working is potholed and not smooth, if it is slanted or hard or is rocky, nails will be prone to split and break. If the elephant stands for a long time in dirty water or water fouled by its own urine and dung, or by chemicals, the quality of the nails can deteriorate.

Prevention in ordinary, healthy elephants:

- Do not restrain or chain the elephant for long periods where the ground is wet, muddy, or fouled by elephant urine and dung.
- Avoid having the elephant walk and work on rough surfaces, areas with sharp rocks, slanted areas, and steep hills. Avoid very dry and hot areas for this makes it easy for nails to peel, split, or fall off.
- Make sure the elephant gets sufficient food, minerals and water.
- Inspect and treat the toenails and footpad before and after each time the elephant travels for a long distance.

Cracks in the footpad are often found in the footpads of elephant made to walk in cities or elephants housed on concrete floors.

Clinical signs: The footpad peels off from the foot. The elephant will not put its full weight on the foot. In some cases, the elephant will use its trunk to spray or put dirt or mud in the crack or cracks.

Treatment:

- Take the elephant off of work.
- Soak the foot in potassium permanganate solution daily for 15 to 20 minutes. Also possible is Povidone-iodine 1% diluted 1:20.

Split toenails are often found in elephants that must often walk in steep and hilly areas. Nail problems are particularly common in elephants.



that do illegal logging in northern Thailand and also in elephants that spend much time on concrete. Poor nutrition or malnutrition also lead to split or broken nails.

Clinical signs: The elephant avoid putting weight on the foot and limps.

Treatment:

- Take the elephant off of work.
- File across the split horizontal to the ground; file the bottom of the split down so it is smooth and does not cause the elephant to catch its foot and stumble and cause the crack to grow.
- Soak the elephant's foot in a diluted solution of copper sulphate.



Abnormal nail growth is often found in elephants that must walk in steep and hilly terrain. Abnormal nails are frequently found in elephants doing illegal logging in northern Thailand and also elephants that spend much time on concrete.

Clinical signs: The elephant will not walk smoothly. Some animals will hobble. Often the nail grows very long.

Treatment:

- Rest the elephant.
- Trim any excessive growth of the nail and then file it smooth.
- Soak the elephant's foot in a diluted solution of copper sulphate.

Treating foot and nail problems should be started very quickly and done correctly. If not, the problem can compound itself and the elephant can become crippled or even die.



THE INSIDE OF THE ELEPHANT

Muscles

กล้ามเนื้อ

Elephants have very strong muscles. Mahouts say that the elephant's 'muscle bundles' are tighter than those of other animals, especially the leg muscles that must support such great weight. The legs must bear a weight of about 2 000-3 000 kilograms in the case of mature elephants. The front legs bear two out of three parts of the weight.

The feet and legs are like those of the hippopotamus and tapir with the front legs longer than the back. Weight is distributed on a foot pad. The elephant has only one gait, the walk, so, unlike a horse, it can neither trot or gallop. Still, using the walking footfall pattern, elephants can "run" [technically, amble] quite quickly. The world record was set by a Thai elephant electronically measured at 23.84 kph. In a working day, a mature elephant can safely transport goods or people over level ground for 25 kilometres. Traversing hills, that distance should not exceed 15 kilometres. (Wild elephants on average cover only 4 kilometres a day.)

In Thailand today some mahouts force elephants to walk on two hind legs, which can lead to injuries of the pelvic area.

Strained muscles

Muscle strains are found mostly in elephants that are at very hard work or are put to unusual work or are fed an unbalanced diet. Most muscle strains are found in the legs.

Clinical signs: The elephant limps and shows it does not want to walk or refuses to make steep climbs. The muscles will be hot and swollen in the strained area, especially if it is on the legs, but if the strain is elsewhere, such as the back, the elephant will use its trunk to suck up water, dust, or dirt to spray on the afflicted area.

Treatment:

- Take the elephant off of all work until the injury has healed.
- Apply hot compresses to the area by soaking a clean cloth in warm water or using a hot water bottle of the appropriate size wrapped in a clean cloth. Hot fomentations are also good.
- *If the condition does not improve, see a veterinarian.*



The elephant has a very large body, weighing on average 2 000 to 4 000 kilograms. The bones thus need to be very big and very strong in order to support the animal's weight and to withstand the activities of daily life. But if the bones that support the massive body are damaged, such as a crack or a dislocation, the elephant — unlike other animals — normally has but little chance of recovering to an ordinary life.

The bones most likely to suffer damage are the hind legs, the ribs, the pelvic girdle, and the lower [lumbrosacral] vertebrae.

The major cause of cracks, breaks and dislocations are accidents such as being struck by a vehicle or another elephant, being struck by a large log, falling downhill, or a landmine explosion. Immediately after an elephant suffers a bone injury, the mahout should help the elephant thus:

- Comfort the elephant so that it loses its fear.
- If there is bleeding, hurry to stanch the flow by pressing a clean sterile cloth or cotton wool on the wound.
- Do not move the elephant and try to keep it from moving until a veterinarian has come. If, however, the elephant is in the sun and can still walk, take it to the nearest shady place (no further than 100 metres).
- Try to find a temporary leaning place for the elephant such as a tree or a large boulder, for example.
- *Consult a veterinarian as quickly as possible.* Have the mahout or the person who the elephant trusts the most stay with the animal. Send somebody else either to fetch the veterinarian or telephone him all of the details so that he can diagnose the condition and arrange for transportation to move the elephant or, if necessary, help devise a means to support the elephant and keep it on its feet.
- Apply cold compresses to any swollen areas.

Bone problems are also often found in calves that have received inadequate nutrition, particularly an insufficient amount of mother's milk that has caused weak bones or incomplete growth, leading to abnormal development. In some cases, such calves are prone to being injured easily, even by minor accidents. Therefore, if you have a calf with such a history, you should avoid putting it to work where accidents are likely to occur. You should also consult a veterinarian.



Warning: Diagnosing whether a bone is broken, cracked, or dislocated is difficult because accurate analysis requires X-rays.

Arthritis

ข้ออักเสบ

Arthritis is a painful condition affecting the joints that comes from both internal causes, such as old age or being overweight or being fed insufficient or poor quality food, and from external causes, such as an elephant being worked beyond its capacity or doing inappropriate work.

Arthritis comes in both acute and chronic forms. The chronic form is very difficult to heal completely, especially because the condition is very difficult to diagnose accurately and because treatment requires such a long period of time. Veterinarians treating chronic cases generally recommend taking the elephant off of work and stopping all activities that might pose danger to the joints and cause the arthritis to worsen.

As for acute cases of arthritis, the onset can happen very quickly. Acute arthritis is usually brought about by overwork or by inappropriate work such as hind-leg walking, head stands, etc. Arthritis can also occur as the side effect of an injury to the feet or legs.

Clinical Signs: The elephant will not use the affected limb or will do so only with great difficulty. The affected area is often swollen.

Treatment:

- If the case is new, in the first 24 hours, take the elephant off work.
- Have the elephant be still and apply cold compresses, a clean cloth wrapped around ice or a cloth dipped in cold water over the swollen area or to the area where the elephant seems to be having pain.
- If the condition has not resolved after 24 hours, apply hot compresses or hot fomentation every day.
- *Quickly consult a veterinarian.*

Alimentary tract

ทางเดินอาหารของช้าง

There are four very interesting facts about the elephant's alimentary tract that are very different from other animals. First, the elephant's digestive system is that of a single stomach, unlike cattle and water buffalo, and it is not very efficient; an elephant digests and absorbs only about 44 percent of the food ingested whereas cattle and water buffalo absorb about 60 percent of what they eat. Second, elephants eat a great



amount of food, over 100 kilograms a day or 6-12 percent of their own body weight. Third, to get so much food, elephants will eat plants of such poor nutritional value that other animals will not normally eat them. Fourth, much of the digestion of nutrients is done not by the elephant's own digestive juices but by tiny germs [bacteria] and animals [protozoa].

With elephants you have huge amounts of poor quality food passing through a tube 40 to 70 metres long and very wide, with much of the digestion being done by guest creatures — the whole process taking 24-50 hours before the dung emerges. Given these strange facts, it should not be surprising that the elephant's guts are perhaps its weakest point.

Parasites in the alimentary tract

พยาธิในทางเดินอาหาร

There are two important types of worms in the alimentary tract, flatworms and roundworms. They are often found in elephants that are raised in natural conditions. The spread of worms can be controlled by daily cleaning of the elephants' living and working areas, specifically by systematically collecting and processing dung. Mahouts should visually inspect the dung of their elephant every day. If they find worms they should consult a veterinarian.

Recommendation to camp managers: An inspection of each elephant's dung for parasites should be done every three months.

1. Liver flukes

พยาธิใบไม้ในตับ

Liver flukes (*Fasciola gigantica*, *Fasciola hepatica*, *Fasciola jacksoni*) are a kind of flatworm found in the liver and the bile duct. Infection comes from snails on the food that the elephant eats.

Clinical signs: The elephant is very thin and has little strength. The skin is rough and the eyes, mouth, and the end of the trunk (on the inside) are very pale and with a yellowish. Digestion is imperfect. The belly is often bloated with water, sometimes leading to dropsy [subcutaneous ventral oedema]. In extreme cases the elephant can die.

Treatment:

- Separate the affected animal from other elephants.
- Take the elephant off of all work.
- *Consult a veterinarian for treatment and diagnosis through examining the dung to identify the species or type of worm. Treatment is usually through Ivermectin-F. (See page 116.)*



2. Cestode worms

พยาธิตัวดีด



Cestodes are about .5-1 cm long and have a sucker-like mouth that attaches to the wall of the stomach and both the short and long intestines, which the worms then eat. At present in Thailand it is not possible to identify exactly which species of cestode worms infect elephants or exactly how the elephants get infected, but it seems most likely that elephants ingest worm eggs found in insects eaten with their food.

Clinical signs: The elephant is listless and remains thin no matter how much it eats. The skin is rough, and hairs are brittle from poor nutrition. The inside of the end of the trunk, the mouth, and the soft tissue of the eyes are very pale. The elephant has little strength because of insufficient nutrients.

Treatment:

- Separate any suspicious animal from other elephants.
- Take the elephant off of all work.
- *Consult a veterinarian to treat the elephant and to make a plan to protect other nearby elephants.*

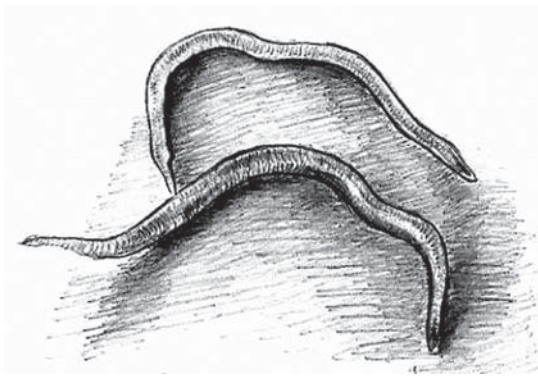
Warning: If one elephant is infected with cestodes, you can assume that all nearby elephants are probably infected as well.

3. Roundworms

พยาธิตัวกลม

Roundworms (mostly Strongyle species) resemble the roots of onions and are 1-2 centimetres long. Infection is through worm eggs on the elephant's food.





Clinical signs: Usually the elephant exhibits no strong symptoms, but it might show the following signs. The elephant is emaciated and exhausted. In young elephants, worms will cause its growth to be stunted. The dung will have many worms.

Treatment: Normally elephants will purge themselves of worms, mostly roundworms, once a year. You can see worms in the dung. As a vermifuge, the elephants eat the leaves or roots or stems of the thorny plant *ton jii* (*Harrisonia perforate* Merr.) or mineral earth at a salt lick to disinfect themselves naturally. The mahout can help by taking the elephant off of work. Many other plants can be consumed:

- The sea bean liana (*Entada pursaetha* DC.)
- The leaves or vines of the thorny plant *ton jii* (*Harrisonia perforate* Merr.)
- The leaves or stems from the black catechu (*Acacia catechu* Willd.)
- The *boraphet* plant (*Tinospora tuberculata* Beaumee)
- The fruit of the ebony tree (*Diospyros mollis* Griff.)
- The bark of the forest siris (*Albizia procera* [Roxb.] Benth.)
- The bark, flowers, and fruit of the golden fig tree (*Ficus benjamina* Linn.)
- The fruits of the bael fruit tree (*Aegle marmelos* [L.] Corr. ex Roxb.)
- The roots of Job's tears (*Coix lachrymal-jobi* Linn.)

If the condition does not improve, consult a veterinarian.

• **Advice:** In some areas where there are no natural salt licks, the mahout can, in consultation with a veterinarian, make an artificial one or can supplement mineral salts.



Ivermectin is a drug that can legally be given only by a veterinarian. It is very effective against parasites in the alimentary tract and comes in two types: Ivermectin, which works against roundworms; and Ivermectin-F, which works against both roundworms and flatworms and is particularly effective with liver flukes. Both drugs work through paralysing the nervous system of the parasites, causing them to lose their grip and to be purged from the elephant's body.

Ivermectin should be given as a preventive [prophylactic] twice a year. If you are working for a long time in a camp where there is a veterinarian or if you always work very closely with the same veterinarian, he will see to this schedule. But for the mahout who moves around or uses different veterinarians, you should keep very careful records of (1) the day of injection, and (2) the dose. If you do not ensure that your elephant is dosed twice a year, it might get parasites. If the elephant is dosed before scheduled, the elephant is given an expensive drug unnecessarily, since a dose will keep the parasite at an acceptable level for a full six months.

Do keep good records. You can write the date and dose given on a calendar, including the next bi-annual treatment. Best, though, is to use the treatment form provided in the *Mahout's Handbook*.

Like many medicines, if too much Ivermectin is used the drug can have bad side effects. If Ivermectin causes your elephant to salivate continually and its eyes to cloud, appearing as if it cannot focus, that is a sign of an overdose. Ivermectin is so powerful that residues in the urine can poison and kill earthworms that are very useful to the soil.

Camp managers: If you own all of the elephants in your camp, it's best if you get a good veterinarian. Even then it is best if you keep health records of your own. If you employ good numbers of elephants owned by other people, you have a choice to leave worming and inoculations to each owner or you can coordinate (and possibly even pay for) treatments. Considering how closely together most camp elephants live, there is a great likelihood of parasites being transmitted between the other owners' elephants. Planned prevention is something you must think about and you should consult with a veterinarian about a program.



Dyspepsia

ท้องอืด

The elephant is unable to excrete waste from its body, which comes about from various causes:

- Eating too much, such as at the beginning of the rainy season when there is much succulent grass
- Eating food that is hard to digest, such as palm fronds or rattan
- An obstruction of the intestines from a foreign object, such as an elephant in the city or a tourist camp ingesting a plastic bag

Clinical signs: The elephant is listless, not interested in food and sometimes is agitated or uses its trunk to strike its belly or apply dirt or mud to its stomach. The belly is swollen or inflated beyond normal and may have involuntary tremors. Some animals will repeatedly stand up and lay down. Some will trumpet or bellow in pain. If the condition is not treated, the animal can die.

Treatment: Usually dyspepsia arises from poor management, such as the mahout giving the elephant food that is hard to digest or repeatedly giving too much food. Thus, the first step of treatment is to find the cause and stop it. Treatment is as follows:

- Take the elephant to a shady, peaceful and clean place.
- Stop food. The elephant will probably not want to drink but if it does, allow it to drink.
- Apply a compress of warm water to the stomach.
- Make the elephant walk so as to stimulate movement of the intestines.
- *If the elephant does not improve, consult a veterinarian as quickly as possible.*

Constipation

ท้องผูก

The elephant cannot evacuate its bowels.

Clinical signs: The elephant is listless and moves nervously in obvious discomfort. It does not eat or drink. The bowels do not move. Some animals will repeatedly lay down and stand up. Constipation is an important factor in causing dyspepsia.

Treatment: With old elephants, it is important to carefully analyse the food they are given. Old elephants should be given food that is easily digested such as ripe bananas. For ordinary healthy elephants it is



important to consider how the food is given, such as whether banana stalks and palm fronds have been properly cut into short pieces.

- Take the elephant to a shady, peaceful and clean place.
- Stop all food. The elephant will probably not want to drink but if it does allow it to drink.
- Use warm water and soap (ordinary hand soap or dishwashing soap are fine) to lubricate one hand and arm and then insert the hand into the rectum and try to pull out as many boluses of dung as possible.
- Give the elephant sticky tamarind (*Tamarindus indica* Linn.) or leaves from the black catechu (*Acacia catechu* Willd.) to stimulate the process of evacuation.
- *If the condition does not improve in one or two days quickly consult a veterinarian for help.*

Diarrhoea

ท้องเสีย

There is a watery, loose discharge that can lead to serious dehydration. There are two major kinds of diarrhoea, non-infectious and infectious.

Diarrhoea without germs

Three main kinds of diarrhoea that do not involve infection by germs.

Diarrhoea from ‘self de-worming’: Normally elephants will purge themselves of internal parasites once or twice a year over two or three days. The elephant will seek out a natural vermifuge such as mineral earth, tree bark, or the roots of, for example, a shrub called *ton jii* (*Harrisonia perforate* Merr.).

Clinical signs: The elephant is listless and does not eat normal food. The dung is loose and watery, often with bits of undigested grass.

Treatment: Generally, this kind of diarrhoea or purging goes away on its own after two or three days.

- Rest the elephant.
- Take the elephant to a shady and easily cleaned place.
- Keep the elephant isolated to prevent spreading parasites.
- Provide a plentiful supply of clean water.
- Supply easily digested food such as ripe bananas in generous amounts.



- Burn the dung, after it dries, or sprinkle it with lime and bury it.

Warning: Worm eggs emerge with the dung. These eggs can infect other elephants if you do not destroy or bury the dung and control the dispersal of worm eggs. For details on internal parasites, see page 113.

Diarrhoea from bad or inappropriate food: This condition can occur from the elephant, for example, eating too much of one kind of food, such as too much sticky tamarind, too much of commercially-bought pellets, or eating only ripe bananas. Diarrhoea can also come from eating food that is difficult to digest or food contaminated with sand or earth or some kinds of antibiotics or disinfectants, for example Povidone-iodine 1%, which can cause irritation that leads to diarrhoea.

Clinical signs: The discharge is much like with self-purging diarrhoea, but you will not normally find many parasites. You will sometimes find some bits of blood if sand or earth was eaten.

Treatment:

- Try to determine the exact cause of the condition, and then immediately stop any contact with that cause.
- Care for the elephant much as you would with self-purging diarrhoea.

Warning: If the diarrhoea extends beyond three days or is very bloody or the elephant shows other signs such as pain, straining, weakness, or extreme listlessness, urgently bring a veterinarian.

Diarrhoea from stress: Elephants, particularly calves and females, are also highly susceptible to sudden diarrhoea when frightened or stressed. (See page 80.) This is what we mean by the idiom “excrement splits” [*khii taek*]. Elephants that are being trucked or separated from familiar companions or their mother can suffer such diarrhoea within 2 or 3 minutes. Sometimes the stress happens over a longer period of time, for example when a strange elephant is chained nearby.

Diarrhoea caused by germs

Several kinds of germs can cause diarrhoea, including bacteria (e.g., *E. coli*, *Salmonella*, *Clostridium*, and *Pseudomonas*).

Clinical signs: Symptoms are much like non-infectious diarrhoea but if the condition continues past three days the cause is probably germs.



Treatment: Apart from keeping the elephant cool, watered, and rested, there is nothing the mahout can do but call a veterinarian.

Enterotoxemia

ท้องเสียจากการติดเชื้อคลอสตริเดียม

Enterotoxemia is due to infection with a bacterium called *Clostridium perfringens*, and the disease has a history of killing many elephants. Enterotoxemia infects mostly elephants that have eaten contaminated food. Enterotoxemia is common in Thailand.

Clinical signs:

- The elephant is uncomfortable and restless or agitated.
- The elephant suffers a loss of appetite.
- Diarrhoea is possible to the point where death comes from dehydration, especially in calves.

Treatment:

- Separate the infected elephant from the rest of the herd.
- Take the elephant off of work.
- Take the elephant to a shady, quiet and clean place.
- Keep very sanitary conditions in regard to dung, other excretions, and uneaten food. Bury or burn waste so that it will not be able to infect other elephants.
- The mahout and anybody who has been in contact with the elephant and its bedding and food remnants should avoid contact with healthy elephants without having first carefully bathed and changed to clean clothes.
- Give highly nutritious food that is easily digested, such as ripe bananas.
- *Quickly contact a veterinarian.*

Salmonellosis

โรคท้องเสียจากซัลโมเนลลา

Salmonellosis is a disease that causes diarrhoea and that can kill elephants, especially calves. Caused by a bacterium called Salmonella, it is most often found in enclosures or camps with poor sanitation. It can spread amongst elephants very quickly.

Path of infection: Salmonellosis is spread through food and water contaminated with the bacteria, especially food that has been stored for a long time, because that enables the germs to multiply.



Clinical signs:

- Continuous, watery diarrhoea
- The discharge has a foul smell.
- The watery discharge contains mucous that may be mixed with blood.
- No appetite, exhaustion
- Fever

Treatment:

- Separate the afflicted animal from all other elephants and supply water to that elephant at a source different from the other elephants.
- Take the elephant to a clean and quiet place.
- Very carefully clean the place where the infected elephant is kept, taking special care to ensure that germs in its dung do not infect other elephants. Salmonellosis can also be spread by flies.
- Give the elephant small amounts of soft easily digested food, such as ripe bananas.
- Make sure there is a sufficient supply of clean drinking water at all times.
- *Consult a veterinarian as quickly as possible.*

Warning: The mahout should be careful to practice good hygiene and wash his hands because salmonellosis is transmissible to other elephants and may be transmissible to humans.

Colibacillosis

ท้องเสียจากเชื้ออีโคไล

The cause of the diarrhoea is the bacterium *Escherichia coli* (which everybody simply calls “E. coli”) that has contaminated the elephant’s food, water or some other ingested source. Colibacillosis is very often found in newly born calves with weak immune systems from having received insufficient colostrum. Also particularly susceptible are young elephants that receive dirty food or that live in unsanitary and improper conditions.

E. coli infects many different mammals, including humans. One common path of infection is when a human, after having had a bowel movement, has not properly washed his hands, and then transmits faecal matter to an elephant by feeding it by hand.

Warning to camp managers: Many zoos in the West have totally banned hand-feeding elephants out of fear of spreading *E. coli* and similar



bacteria. While stopping hand-feeding is probably impossible in Thailand, where it generates much income, camp managers should be aware of the danger of infection.

Clinical signs:

- Fever
- Not interested in food
- Diarrhoea to the point of severe dehydration, even until causing death

Treatment:

- Separate the infected individual from other, healthy elephants.
- Take the elephant to a shady, clean and quiet place.
- Provide small quantities of soft food, such as ripe bananas.
- Have plenty of clean drinking water available to the elephant at all times.
- Clean the keeping area of the infected elephant very carefully, being especially careful to make sure that neither its urine nor dung can contaminate nearby areas holding healthy elephants. (Drainage of cleaning water should flow to an area where there are no elephants or people.)
- Care providers and others who have contact with the infected elephant should bathe very carefully and should change their clothes before contacting non-infected elephants.
- *Consult a veterinarian as quickly as possible.*

Disease

Pneumonia

ปอดบวม

Pneumonia is a disease of the elephant's respiratory system. Pneumonia comes in both viral and bacterial forms, so the exact cause is usually not clear, at least unless very sophisticated testing is done in a laboratory. Pneumonia often attacks after an elephant has been debilitated by another disease.

There is presently no vaccine or other medical means to prevent the disease, but it is clear that pneumonia often effects elephants exhausted from overwork; also particularly susceptible are poorly fed or underfed elephants, as are elephants in prolonged stress.

Pneumonia is found in elephants of all ages.



Clinical signs:

- Mucous drips from the trunk; and the elephant salivates copiously, drooling from the mouth.
- Loss of appetite
- Fever

Treatment:

- Separate the elephant from other elephants.
- Take the elephant to a shady place or a roofed enclosure with good ventilation.
- Provide supplementary food such as ripe bananas, unhusked rice, sugarcane, and fresh grass.
- Provide ample clean water.
- *Consult a veterinarian immediately, especially for calves.*

Anthrax

โรคแอนแทรกซ์หรือโรคกาฬ

Anthrax is a highly infectious disease, a bacterium that strikes elephants of all ages. Anthrax also attacks cattle, horses, water buffalo and other warm-blooded animals, including humans who work with those animals. When the bacteria enter the bloodstream, they multiply very quickly. Septicaemia, a blood infection, usually follows. Death happens very quickly, usually within one or two days. Sometimes the elephant dies very soon after the sickness is recognized. Even after elephants' deaths, the anthrax bacteria infect not only their carcasses but also their skins and even their ivory.

The path of infection: The anthrax bacteria create spores, very hardy organisms that can survive for many decades and are highly resistant to heat and to chemical disinfectants. Domesticated elephants usually catch anthrax when grazing on infected pastures or eating contaminated food. Infection happens most often when grass is low and scarce, and often becomes epidemic when heavy rains follow the dry season. Infection can occur through respiration, exposure to blood, lymphatic fluids, and dung.

Clinical signs:

- The elephant will have a very high fever, which can be observed through reddishness of the eyes, mouth, and the inside of the tip of the trunk.



- Take the elephant's temperature often; write down the time and the temperature for the veterinarian's use.
- The elephant has hot breath and can experience difficulty breathing.
- The elephant is very listless; the trunk, ears, and tail do not move.
- The elephant seems to be staring and has dilated pupils.
- The elephant may collapse very suddenly.
- The elephant eats and drinks much less.
- The elephant may have diarrhoea which may contain blood.
- Sometimes there is swelling under the skin (usually at the throat, back of the ear, shoulders, abdomen and between the anus and the sexual organ). At first these swellings are hot, hard and painful but later become cold and do not elicit pain when touched.
- There can be bleeding from the nostrils, inside of the mouth, birth canal, penis, or anus.

Treatment:

- *Seek a veterinarian as quickly as possible. The only treatment consists of antibiotic drugs that can be prescribed only by a veterinarian. (Treatment is often futile, and elephants infected with anthrax usually die.)*
- In the chronic stage of anthrax, the disease often resembles other diseases; consequently, an accurate diagnosis is possible only by testing in a laboratory.
- The elephant must be isolated as quickly as possible, and all other elephants should be moved as far away as possible.
- Mahouts and other people who touch or handle the sick elephant should never go near or touch other elephants that have not yet been infected.
- The elephant should be kept in a clean, shady, and quiet place.
- Highly nutritious and tempting food such as ripe bananas, sugarcane, and green grass should be offered.
- If it is clear that the animal is going to die but it can still walk, you can move it to a site where disposal is more convenient or better protects against future infection.
- If the animal should die, if possible the carcass should be burned, as should all ruined fodder, dung, bedding, etc. If the carcass can not be burned, it must be buried in a very deep pit, with the carcass well covered with lime before filling with earth. (See page 55.)



- If the animal should die, it is highly recommended that the tusks not be removed but rather buried or burned with the animal. Any removal of tusks without disinfecting the head, the tusks, and the workers and their tools can result in human infection and death.
- If while butchering a carcass (or doing a post mortem) of any elephant that has died of unknown causes, you encounter purple or dark red coloured blood (rather than the usual bright red), stop your work immediately and consult a veterinarian. Purple or dark red unclotted blood is a sign of anthrax.

Haemorrhagic septicaemia (Pasteurellosis)

โรคคอบวม

Haemorrhagic septicaemia is a virulently infectious and contagious disease with a very high death rate. It is very easily confused with anthrax because the symptoms are similar and because, like anthrax, more victims die than respond to treatment. The infection can run through a herd of elephants very quickly, in about 10-15 days. Elephants usually die within 3-36 hours, although some last for 15 days.

Path of infection:

- Elephants often contract the disease from cattle and water buffalo.
- Haemorrhagic septicaemia is often found in low-lying flooded areas and often occurs with changes in season.
- Infection comes through drinking contaminated water or eating contaminated food or inhaling infected droplets, usually from living in association with cattle and especially water buffalo.
- Elephants, especially mature elephants, normally have some pasteurella bacteria in their body at all times without impairing their health. Stress is often the precipitating factor that leads to full blown haemorrhagic septicaemia. When an elephant becomes weak or is malnourished or overworked, when the weather or diet changes, or the elephant is transported, etc., the bacteria may erupt quickly, leading to clinical infection, especially in young calves just past weaning and as yet without a strong immune system.

Clinical signs:

- There is a high fever. Take the elephant's temperature. (See page 71.) If it is over 37.8° C or 100° F, that is a sign of danger.
- The breath exhaled from the mouth and trunk is very hot.



- There is a bright red at the eyes, mouth, the end of the trunk, and other soft tissue.
- Swelling is found in body parts such as the throat, the shoulders, the base of the tail, the anal flap, on the belly under the legs.
- The elephant is listless, the trunk rests on the ground, and the ears do not flap.
- The elephant does not eat.
- The elephant frequently opens its mouth to “yawn”.
- The body trembles and has spasms because breathing is difficult.
- The urine is cloudy and richly coloured.

Treatment:

- *Consult a veterinarian immediately to treat the infected animal and also to make a plan for protecting other nearby elephants.*
- Immediately separate the infected elephant and keep it as far away as possible from other animals.
- Take the infected elephant to a clean, quiet and shady spot that is easily cleaned and where run-off water and waste, such as dung and uneaten food, do not contaminate other areas.
- Most importantly, ensure that the water source for sick animals and healthy animals is separate. If there is only one source of drinking water, it is likely contaminated. If so, try to get the healthy animals to a new source of water. You might even have to truck water in, but you must ensure your animals are drinking pure water free of infection.
- Make sure that no mahouts or other people who have been in contact with the ill elephant have any contact with the healthy elephants.
- The healthy elephants should be taken to a place where they have no contact with dung, urine, or uneaten food of the infected elephant.
- Feed the elephant with items of high nutritional value, such as bananas, unhusked rice, sugarcane, and fresh grass.
- When an elephant dies of haemorrhagic septicaemia, the carcass must be buried or burned. The carcass should not be butchered for meat or to remove the tusks to sell because this can spread the disease to other elephants and to other animals.

Prevention: Haemorrhagic septicemia is preventable by an annual vaccination good for a year, but this vaccine often causes the area around the injection to have an allergic reaction and to swell for three or four days. This swelling can be treated by hot compresses and fomentation.



Tetanus is caused by a long-living anaerobic bacterium that is found in the soil and in moist areas. Tetanus is usually found in elephants that have suffered deep wounds, usually in the foot and particularly through the footpad being pierced by a metal object such as an old, rusty nail. After the bacteria have entered the elephant's body they thrive and, after an incubation period of 15-20 days, neurotoxins are produced that damage the nervous system and cause typical muscular spasms.

Between about 1977 and 1992 Thailand experienced, on a massive scale, thieves cutting off elephants' tusks by stealth in order to sell them. One result was that many tuskers contracted tetanus and died.

Path of infection: Infection proceeds from stepping on a piece of metal or other contaminated object that causes a deep wound. With elephants, however, the wound might not be obvious because elephants can and do use their trunks to gather dirt (which might be contaminated) to stuff in wounds, including cut tusks. When tetanus enters a tusk's pulp cavity, it spreads very quickly because it thrives in environments where there is no oxygen.

All wounds must, of course, be carefully cleaned but be especially careful where the puncture is from nails or rusty old metal, especially in an area that has long housed many animals. After infection, the disease does not progress quickly and the elephant will appear normal for 15-20 days (sometimes even longer) before symptoms appear. Even if the elephant receives treatment, the survival rate is very low.

Clinical signs:

- The elephant often has a temperature of over 37.8° C or 100° F, although this is not certain. The breath will be noticeably hot to feel.
- The eyes will be very red, and the soft tissue inside the mouth and the trunk will be a dark red.
- The elephant is listless and does not eat or drink water.
- The nervous system is affected, and the leg muscles harden in muscular contraction; the tail has a supple, snake-like feel.
- There are periodic spasms, particularly when the elephant is startled, as by a loud noise or bright light.
- In following days, it becomes difficult for the elephant to walk and stand because of the contraction of the leg muscles.



- The jaws lock tightly, making it difficult to chew food. Eating and drinking become very difficult and the elephant dies.

Treatment:

- *Consult a veterinarian immediately.*
- Even though tetanus is not contagious to other elephants, separate the elephant from other animals as it will be more peaceful.
- Take the elephant to a shady shelter with a clean surface, such as a concrete floor (it should not be slippery) to prevent it from introducing earth or other unclean materials into the wound or the pulp cavity.
- The area should have good ventilation.
- In cases of an exposed pulp cavity, it is best to clean it with running tap water through a hose. Wash all wounds thoroughly with clean water then flush with an antiseptic solution such as Betadine or Povidine-iodine 1% in a 20:1 solution. Finally, apply an anti-insect powder that includes an antibiotic, such as Negasunt.
- Hand feed the elephant with small amounts of easy to eat foods with high nutritional value, such as ripe bananas, sticky rice, ripe papayas, etc. (See page 22.)
- Clean the wound every day.

Prevention: For elephants that have open wounds or exposed pulp cavities in tusks, prevent the elephant from contracting tetanus by daily cleaning of the wound and by keeping the elephant on a clean surface. Otherwise the elephant is likely to introduce dirt or other unclean material that could contain tetanus germs into the wound.

No vaccine yet exists for elephants but if an elephant with a wound seems to have been exposed to tetanus, a veterinarian can inject an antitoxin to prevent infection from the bacteria.

Tuberculosis

วัณโรค

Tuberculosis is a chronic disease of the respiratory system that usually enters the body through the trunk, the windpipe [trachea], and the lungs. Tuberculosis is a bacterial disease (*Mycobacterium* spp.) that can infect both elephants and humans. Tuberculosis is a critically important disease because it can be transmitted from people to elephants, from elephants to people, and from elephants to elephants. Besides people and elephants, tuberculosis also affects primates, cattle, horses and other animals.



Tuberculosis in elephants has been reported in Thailand, but in the early stages the disease is notoriously difficult to diagnose and to verify. The high human rate of infection and the intimacy of mahouts with their elephants strongly suggest that there are many tuberculosis-infected elephants in Thailand.

Today in Thailand the disease AIDS is epidemic in humans. A major cause of death brought about by AIDS, which compromises the immune system, is tuberculosis because tuberculosis is an opportunistic disease that attacks when the body's defence systems are weak. Consequently, tuberculosis in humans is spreading in Thailand, and thus the chances of elephants contracting tuberculosis are increasing.

Tuberculosis in elephants can be very expensive and very difficult to treat. The disease is a big problem in European and American zoos.

Path of infection: The bacteria is usually transmitted directly through exhaled air [infected respiratory droplets] and phlegm. Transmission can also occur through contaminated food or water and also dung, urine, milk, semen, and other bodily secretions.

Clinical signs:

- Symptoms may be lacking until after 1-2 years and the disease is quite advanced.
- The elephant is weak and unable to work normally.
- The elephant loses weight when it is eating normally, in some cases very rapidly.
- The elephant loses its appetite.
- The elephant becomes thin.
- Mucous and discharges are emitted from the trunk.
- The breath smells bad.
- Sometimes there is a dry cough and breathing difficulties.
- When you see an elephant infected with tuberculosis that is very thin, drools saliva continually and sometimes involuntarily vomits and “coughs” as if it has something in its throat, it is usually about five days before the animal will die.

Treatment:

- *Consult a veterinarian, because only a veterinarian can diagnose and treat this disease.*
- When you first suspect an elephant might have tuberculosis, immediately separate the suspect elephant from all other elephants.



- Consult a veterinarian familiar with the disease; he will conduct a trunk wash to collect samples in order to make an accurate diagnosis.
- Rest the elephant in a shady place or, better, in an easily cleaned enclosure with good drainage.
- Supply the elephant with as much highly nutritious food as it wants.
- Supply plenty of clean water.

Prevention: Annually inspect the health, including chest X-rays, of all mahouts, care givers and other involved persons. If an infected person is found, provide treatment and keep that person from having any contact with elephants until the condition is cured. Camp managers of large facilities, especially, should be careful to follow this procedure; while it will entail some inconvenience and some costs, they are far less trouble and expense than if tuberculosis should erupt in your camp.

Herpes virus

เฮอริปีส์ ไวรัล

Herpes virus has a history in African elephants, where it is found in the lungs as has been shown by necropsies. The disease is usually found in elephants kept in confined enclosures with poor air circulation. In Western zoos, herpes virus has been found in both African and Asian elephants. Young animals are particularly susceptible.

Herpes virus has not been reported in Thailand. In any case, the symptoms are not very obvious and thus a confirmed diagnosis can only come from a veterinarian, and even then only after extensive laboratory testing. In some elephants, especially calves, the tongue, mouth, and the inside of the tip of the trunk will show a blue discolouration [cyanosis].

Symptoms are likely to appear at times when elephants are in poor condition or their immune systems are low, leading to secondary infections such as respiratory diseases.

Foot and mouth disease

โรคปากเปื่อยและเท้าเปื่อย

Foot and mouth disease is an important contagious disease of hoofed livestock. This highly infectious disease is often found in cattle, water buffalo, and pigs. Foot and mouth disease is a virus that in Thailand is contracted by elephants mainly through contact with infected cattle and water buffalo. The disease is not common among elephants.



Livestock infected with foot and mouth disease are usually destroyed, but because elephants are considered to be very important, having spiritual importance in Thai culture, they are not destroyed.

The path of infection:

- Infection can come from inhaling the virus which can be carried in the air.
- Infection can come from direct contact with other animal's sores and bodily secretions.
- Foot and mouth disease virus is also found in faeces, urine, milk, saliva and even in the blood, bone, meat, etc., of infected livestock. Infection can come from infected food and water.
- After infection, the virus incubates for 2-5 days before the symptoms are noticeable.

Clinical signs:

- A low fever
- Listless and inactive
- The elephant's mouth has blisters [vesicles], that are at first white and small but then grow. The feet also suffer blisters that turn to open sores, making it difficult for the elephant to eat and to walk.
- Limping is sometimes the first indicator of the disease, and sometimes the footpad will slough.
- The elephant salivates copiously and often appears to be drooling.
- Loss of appetite

Treatment:

- Immediately separate the infected animal from other elephants.
- Take the infected elephant to a shady, clean and quiet place.
- Feed the elephant with soft, highly nutritious, and easy to digest food, such as ripe bananas.
- Keep a careful eye on all the uninfected animals in the herd.
- Prevent any mahouts who have had contact with the infected animal from having contact with any other elephants (or other hoofed livestock) until they have bathed and changed clothing.
- *Quickly consult with a veterinarian in order to treat the sick animal and to consider vaccinating the as yet uninfected elephants in the herd.*
- Mahouts must be very careful that elephants with FMD do not get secondary infections, to which they are very vulnerable.



- Treating elephants afflicted with foot and mouth disease takes many months before complete, and recovery is usually slow because in Thailand conditions are usually very unsanitary and FMD-infected animals are highly susceptible to secondary infections.

Prevention:

- Foot and mouth disease can be prevented by regularly vaccinating cattle, water buffalo, goats, and pigs that are raised near the elephants. Vaccinating these animals is easier and more convenient than vaccinating elephants, because there is at present no vaccine especially prepared for elephants.
- If forced to work in border areas where elephants and livestock might have come from Myanmar [Burma], Lao PDR [Laos], and Cambodia, be very careful that elephants should not come into contact with livestock where it is unclear whether or not they have been vaccinated against foot and mouth disease.
- Consult with the district Livestock Department veterinarian about the presence of the disease before coming to work in any border area.

Elephant pox

ฝีดาษ

Elephant pox is a serious, infectious viral disease that has a history of being epidemic. (Out of 18 elephants in a European circus, 11 became infected and one died.) Elephant pox, which is related to the human disease smallpox, can be contracted by humans. Asian elephants are more susceptible to pox virus infection than are African elephants.

Wild rodents are suspected of being the reservoir of elephant pox virus. It seems that there has never been a case of elephant pox in Thailand, but the disease has been reported in Myanmar.

Path of infection: Elephant pox is contracted, both by elephants and humans, by direct contact with the sores or mucous of an infected elephant.

Clinical signs:

- The first clinical signs of elephant pox are difficult to detect.
- A high fever may be present.
- The elephant may become lame.
- Membranes of the eye become infected and swollen.



- Later, the elephant develops pustules on the skin on the front of the head and on the trunk. These may spread over the whole body. The pustules may rupture and discharge a clear, bloody or purulent fluid. Later, they become dry and crusty and finally unpigmented scars.
- Seeping from the temporal gland — in both sexes — is a fluid that is either clear or with a milky colour; this fluid smells rotten and is not like the musty, sour smell of the normal secretion of musth males.
- The mouth has sores that make swallowing difficult.
- A serious secondary complication of elephant pox is undermining of the nails and soles, which can produce fatal complications.

Treatment:

- Immediately separate the elephant from other animals in the herd.
- Take the elephant to a shady, clean, and quiet place.
- Feed the elephant with highly nutritious food that is easy to swallow, such as ripe bananas or other fresh fruit.
- Mahouts who have had contact with the elephant should bathe and change clothes before contact with uninfected elephants.
- *Immediately contact a veterinarian*

Rabies

โรคพิษสุนัขบ้า

Rabies is a viral disease contacted by being bitten by an infected animal, in Thailand almost always a dog. The virus germs are found in the dog’s saliva and some will stay with the wound. The virus will then incubate in an elephant for a period of up to 30 days, depending partly on the severity of the bite wound. After the incubation the virus will find its way to the elephant’s nerves, spinal cord, and the brain. In elephants, rabies almost invariably brings paralysis and then death.

Anytime an elephant is bitten, particularly if the bite has drawn blood, the mahout and owner should take four actions. First, write the day on a calendar; then you will be able to predict when the elephant may show clinical signs if it was infected. Second, talk to people who know the dog and ask about its behaviour in the days prior to the attack; if the dog has been acting strangely (staring fixedly, foaming at the mouth, etc.) there is a good chance the dog is rabid. Third, inform everybody in the community of the health hazard, because the disease also attacks humans, and ask them to help track down the dog. Fourth, very carefully capture



the dog, confine it securely, and observe its condition; if after ten days it is normal then the elephant does not have rabies.

Clinical signs:

The initial signs of rabies in elephants may be vague but most often the elephant:

- Is listless.
- Prefers to stay in dark places.
- Eats very little.

As the disease progresses the elephant likely:

- Writhes in pain.
- Does not recognize the mahout.
- Chases and attacks humans and animals.
- Has eyes that roll and wander.
- Does not eat.
- Walks unsteadily and the legs lose strength.
- Goes to the ground in paralysis.
- Has locked jaws and the tail hangs still.
- Has saliva flowing continuously.

Death may shortly follow the appearance of these more severe signs. If the elephant dies, see “Disposal of Elephant Carcasses” (page 55).

Treatment:

- *Quickly consult with a veterinarian.*
- There is no effective treatment once the symptoms have appeared.
- Immediately after a dog bite, wash the wound intensively with soap and water. Then apply tincture of iodine or Povidone-iodine 1%.
- Even though the disease is not contagious to other elephants, separate the elephant, taking it to a shady, clean and quiet place.
- Make sure the elephant is chained tightly and securely.

Prevention: Because rabies is incurable the best prevention is to eradicate all stray dogs from the area and to annually vaccinate all the dogs and cats in the community.

Trypanosomiasis (Surra)

ทริปปาโนโซมหรือเซอร์รา

Trypanosomiasis comes from a protozoal blood parasite. It can infect horses, donkeys, mules, camels, cattle, buffaloes, dogs and elephants. While not often seen in elephants, cases have occurred in Thailand.



The trypanosomes are carried by jungle flies and gadflies [*Tabanid* and *Stomoxys* spp.] that suck blood from infected animals and then transmit the parasite to healthy animals when they bite them.

Trypanosomiasis is most often found in elephants that have been worked very hard and is usually found in the rainy season, when biting flies are in great abundance.

Clinical Signs:

The clinical signs of trypanosomiasis are usually very difficult to observe.

- Before the point where visible symptoms appear, elephants will progressively get thinner and lose strength. The inside of the mouth and the inside of the trunk become very pale.
- The elephant will make sounds that suggest pain, show signs of stomach pain, and breathe hoarsely. It will appear dull, listless and sleepy.
- The hair will become coarse and brittle.
- Sometimes there is a swelling of the lymph nodes under the jaw.
- Infected animals do not die immediately but rather suffer a chronic condition of becoming thinner, increasingly more listless, and suffering progressively debilitated health.
- The elephant is likely to die within 2-4 months of infection.

Treatment:

- Quickly separate the animal from other animals in the herd.
- Take the elephant to a shady, peaceful and clean place, away from biting flies.
- Carefully and regularly inspect all the other elephants.
- *Consult a veterinarian to make a diagnosis and to apply treatment, including a plan to keep nearby uninfected elephants healthy or at least to treat them immediately after infection becomes apparent.*

Prevention: The best prevention is to keep the flies from biting the elephants by spraying them with a mixture of medicines such as Arsuntol and Neguvon. (See page 61.)

Biting flies may be reduced in numbers by regular disposal of the dung and soiled bedding in which some species breed.

