Beetles

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General

Although beetles have the greatest wealth of species of all insects, only a few are directly harmful to human health. A few beetles, chiefly belonging to the Scarabaeidae and Tenebrionidae, can be intermediate hosts for worms, such as the tapeworm *Hymenolepis diminuta* (the cause of non-specific abdominal discomfort).

Blister beetles

Blister beetles are insects that cause skin lesions by direct contact. They are found on various continents. They contain highly poisonous substances such as cantharidin or pederin. Cantharidin is found in the haemolymph of the beetle and is released when the insect is crushed. A number of insects secrete the caustic fluid via their leg joints when they are disturbed (“reflex bleeding”). In *Lytta vesicatoria* cantharidin is also found in the wing sheath.

Paederus sp. blister beetle. Contact with the animals can result in severe dermatitis or eye inflammation. The insects contain paederin, a blistering agent. Copyright ITM

Blister beetles toxins


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Dermatitis resulting from contact with blister beetles (Paederus sp). Copyright ITM, Dr Van den Enden

Dermatitis secondary to contact with a blister beetle, Paederus sp. (fam. Staphylinidae). Contact with the eyes leads to the so-called ”Nairobi eye”. Copyright ITM

Pederin

Pederin is the active vesicant of the short-winged beetle *Paederus fuscipes* and related species. It is a complex non-protein molecule. Pederin is highly toxic, more potent than cobra venom. It inhibits protein synthesis and prevents cell division.

Cantharidin

Cantharidin binds chemically to phosphatases 1 and 2A. The toxin is very stable. Dead beetles are still dangerous. Consequently control by means of insecticides does not remove the danger. The toxin

protects the beetles from predators and is found in the haemolymph and gonads.

Cantharidin systemic effects

Sometimes cantharidin is swallowed. The toxin is readily absorbed from the intestine and excreted in the urine. If cantharidin is swallowed to arouse sexual appetite, in an attempted suicide, by accident, with criminal intent or to induce abortion, several symptoms may occur depending on the dose. The initial discomfort begins within 30 minutes. Dysphagia as a result of mucositis with irritation of oral, oesophageal and gastric mucosa is followed by abdominal pain, nausea and vomiting, possibly with blood. Oedema, bleeding and necrosis of the mucosa occur at an early stage. There is intense congestion of the genito-urinary tract, with bleeding in the renal pyelum, ureters and bladder. Bleeding can also occur in the ovaries. Sometimes there is internal bleeding and bruising. Priapism occurs, which was the origin of the use of the substance as an aphrodisiac (Gr. Aphrodite = goddess of love). Diarrhoea occurs, accompanied by leukocytosis, haematuria, renal tubular necrosis, uraemia, shock and coma. Approximately 30-60 mg is sufficient to kill an adult person.

Clinical aspects

On skin contact with cantharidin-containing blister beetles, local tissue irritation occurs after a few hours. In intra-epidermal blister formation, redness, oedema and vesicles can appear on the skin.

Sometimes there are “kissing lesions” on the elbow or in the hollow of the knee. In contrast, the effect of pederin is not immediately noticeable and only becomes apparent after 1 to 2 days. The erythema is much more severe and can persist for months. On contact with the conjunctiva and/or cornea, *Paederus* sp. cause “Nairobi eye”. This is associated with extensive painful peri-orbital swelling and purulent conjunctivitis. Corneal erosions and blindness can follow.

Treatment

For external lesions, the skin should be rinsed copiously as rapidly as possible. After disinfection, silver sulphadiazine cream should be applied. Subsequent care is the same as for a burn. Skin lesions caused by cantharidin practically always heal without leaving scars. An eye that is affected should be rinsed copiously. Afterwards an antibiotic- and steroid-containing eye ointment should be applied (cfr. eye lesions caused by spitting cobras).

There is no specific antidote. Steroids are not effective in controlling the ulcers in the gastro-intestinal

tract. Fluid, calcium supplements, analgesics and broad spectrum antibiotics should be given. Gastric lavage should be carried out and activated charcoal administered. Cantharidin is to a large extent bound to albumin and is not removed by haemodialysis via a charcoal column. Physiological fluid should be administered IV. A blood transfusion might be necessary. Maximum diuresis must be obtained with IV fluid, mannitol and diuretics. No fat should be given orally because it increases the absorption of the toxin.

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