

OLD WORLD SCREWORM

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PARASITE

*Chrysomya bezziana*ZOOZONOSIS

SUSCEPTIBLE ANIMAL GROUPS	TRANSMISSION	CLINICAL SIGNS	SEVERITY	TREATMENT	PREVENTION AND CONTROL
Mammals	Female fly lays eggs in wounds and mucous membranes	Fly larvae burrowing deep and head downwards into pocket-like wounds	Possibly fatal, if patient is not treated	Organo-phosphorous insecticides	Inspection Quarantine Insecticides

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DISEASE AGENT <i>Chrysomya bezziana</i> (Villeneuve) is an obligatory myiasis agent belonging to the family of Calliphoridae. The larvae of this dipteran are armed with broad, encircling bands of spines (resembling the threads of a screw) and they tunnel deeply head downwards into the host's tissue (like <i>Cochlyomyia hominivorax</i>). Such larvae are commonly named "screwworms".	
SUSCEPTIBLE ANIMAL GROUPS Domestic animals and many species of wildlife are affected.	
ZOOZONOTIC POTENTIAL The Old World screwworm is primarily a veterinary pest. However, cases of human myiasis by <i>C. bezziana</i> are common in the Oriental region but rare in Africa.	
DISTRIBUTION <i>C. bezziana</i> is found in Africa (from south of the Sahara to northern South Africa), the Indian subcontinent, and southeast Asia (from southern China and Taiwan through the Malay Peninsula and the Indonesian and Philippine islands to Papua New Guinea). It has also been introduced into several countries around the Persian Gulf. The fly is not able to survive long periods of cold or drought. The climatic requirements of <i>C. bezziana</i> and <i>C. hominivorax</i> are very similar, and their potential distributions, if unrestrained, would probably overlap considerably. <i>C. bezziana</i> is not found at altitudes higher than 2500 m above sea level.	
TRANSMISSION The reproductively mature, 6 to 8 days old, female is attracted to wounds for oviposition. Oviposition occurs in the afternoon at three-days intervals. Batches of about 100 eggs are laid on the upper, dry side of the wound. Within 16h larvae emerge and burrow deeply into the wound. After 6 to 8 days larvae leave the wound and pupate in the soil. Development rate of immature stages is influenced by environmental temperature, being slower at low temperature. The pupal stage lasts generally 8 to 10 days (but can last up to 2 months when temperature is low). Thus the complete cycle takes at least 3 weeks. Mean life-expectancy in Papua New Guinea is estimated at 9 days under a mean field temperature of 26.5 °C. This equates to completion of 1.7 ovarian cycles. The female fly generally mates once in a lifetime. Dispersal of <i>C. bezziana</i> was studied	

in New Guinea: the median and maximum distance females dispersed before depositing an egg mass was 11 km and 100 km respectively. The adult fly feeds on decaying organic matter.

CLINICAL SIGNS

Areas most susceptible to attack by *C. bezziana* are the navels of newborn animals, wounds and tick bites. Sometimes eggs are laid near body orifices: anogenital area, nose and auditory canal. The larvae, closely packed with their heads down, feed on the living flesh and body fluids. They can burrow as deep as 15 cm into the host's living tissue. Infested wounds are generally socket-like and circular. At first sight larvae may not be visible, while they are situated deep in the wound. Infested wounds have a characteristic odor which is attractive to gravid flies of the same or of other myiasis-producing species. In a severe infestation that is left untreated, death may occur.

DIAGNOSIS

Morphological characteristics of the larvae: larvae being collected for diagnosis should be removed from the deepest part of the wound to reduce the possibility of collecting non-screwworm species. Segments 2 to 10 of the larva bear prominent rings of spines. The posterior spiracles on the terminal segment are surrounded by a dark incomplete ring (the peritreme) which encloses three straight slits pointing towards the break in the peritreme.

Larvae of *C. hominivorax* can be distinguished from those of *C. bezziana* because the latter have their dorsal tracheal trunks in the terminal twelfth larval segment pigmented for no more than a third of their length, and because the dark button adjacent to the opening in the peritreme is absent in *C. bezziana*. The shape of the intersegmental spines between the pro- and mesothorax of third instar larva of *C. bezziana* markedly differ from other blow fly species.

Morphological characteristics of the fly: deep blue to blue-green metallic body color with two dark longitudinal stripes on the thorax and large orange-yellow eyes. The dorsal side of the thoracic squamae are completely covered with tiny hairs.

A species-specific real-time polymerase chain reaction (PCR) assay to confirm or refute the presence of *C. bezziana* in trap catches has been developed and is sensitive enough to detect one *C. bezziana* in a sample of 1000 non-target species.

SAMPLES REQUIRED FOR LABORATORY ANALYSIS

Samples of the myiasis-producing larvae (preserved in acetic alcohol) or adult specimen (dried or preserved in 70% ethanol).

TREATMENT

For local treatment of infested wounds organophosphorous formulations containing relatively high concentrations of coumaphos (3 to 5% ai) or fenchlorphos (2.5% ai) can be used.

Infested wounds can also be treated with an aerosol of 1% diclofenthion. Any dead larvae remaining in the wounds should be removed with forceps in order to prevent sepsis. When a group of animals is infested, spraying the animals with an 0.25% aqueous suspension of coumaphos, 0.05% diazinon or 0.005% deltamethrin would be indicated. In some areas strategic dipping of the animals (in 0.1% coumaphos, 0.05% diazinon, 0.05% chlorfenvinphos or 0.0025% deltamethrin) may be an attractive alternative as it will control screwworm as well as ticks and other external parasites.

It is possible to use the sterile insect technique to control or eradicate this fly. However, no large breeding colonies of this fly exist at this moment.

PREVENTION

To prevent the spread of the disease beyond present limits, strict observation of the requirements for international trade, as set out in the OIE International Animal Health Code, is necessary.

When importing from countries considered infested with New World or Old World screwworm, Veterinary Administrations should require for domestic and wild mammals the presentation of an international veterinary certificate attesting that:

1. Immediately prior to loading, the animals have been inspected on the premises by an Official Veterinarian and that any infested animal has been rejected for export;
2. Immediately prior to entering the quarantine pens in the exporting country:
 - a. each animal has been thoroughly examined for infested wounds by an Official Veterinarian and that no infestation has been found in any animal;
 - b. any wounds have been treated prophylactically with an officially approved oily larvicide at the recommended dose;
 - c. all animals have been dipped, sprayed, or otherwise treated, immediately after inspection, with a product officially approved by the importing and exporting countries for the control of New World or Old World

screwworm, under the supervision of an Official Veterinarian and in conformity with the manufacturer's recommendations;

3. At the end of the quarantine and immediately prior to shipment for export:
 - a. all animals have been re-examined for the presence of infestation and all animals have been found free of infestation;
 - b. all wounds have been prophylactically treated with an approved oily larvicide under the supervision of an Official Veterinarian;
 - c. all animals have been prophylactically treated again by dipping or spraying as in point 2) above.

The floor of the quarantine area and transport vehicles must be thoroughly sprayed with an officially approved larvicide before and after each use. The transit route must be the most direct, with no stopover without prior permission of the importing country.

On arrival at the importation point, all animals must be thoroughly inspected for wounds and possible New World or Old World screwworm infestation under the supervision of an Official Veterinarian. The bedding material of the vehicle and the quarantine area should immediately be gathered and burned following each consignment.

CONTROL

Insecticidal treatment of animals can be carried out by an appropriate insecticidal spray or by injection with doramectin or ivermectin. At a dose rate of 200 µg/kg ivermectin is effective against *C. bezziana* in preventing strike.

Trapping systems and surveillance of the hosts are used to monitor the presence or absence of the myiasis producing fly. Traditionally the standard sticky trap and an attractant "Swormlure" are used. However, the modified Lucy-trap with a new attractant mixture, Bezzilure-2, is recommended for screwworm fly surveillance.

LEGISLATIVE REQUIREMENTS

Old World screwworm infestations are notifiable to the World Organisation for Animal Health (OIE 2019).

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