

Dermatitis caused by the bite of Blackfly in a 32 –year old man

M Youssefi, A Aminpour, F Arabkhazaeli

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Abstract

Simulium flies (commonly referred to as 'blackflies') consist of more than 1700 species divided in 19 genera, of which more than 40 genera are of medical and veterinary importance. This article describes a 32-year-old man who was attacked by blackflies while camping in Gahar, Dorood Township, Khorram Abad province, Iran. These flies are vectors of different microorganisms in humans, great variety of mammals and birds. In humans they are vector of filaroid nematode *Onchocerca volvulus*.

INTRODUCTION

Simuliidae consist of more than 1700 species in 19 genera of which more than 40 are of medical and veterinary importance. Some of the most important genera of this family are *Simulium*, *Prosimulium*, *Parasimulium*, *Australosimulium*, *Cnephia* and *Gigantodax*. Adults are 1-5 mm in length, most frequently black but occasionally yellow or yellowish-brown. These flies have prominent eyes, short mouthparts and 11 segmented antennae (1). Humped thorax, broad colorless wings with distinct venation which at rest are held like the closed blades of a pair of scissors are other morphological characteristics of these flies (2).

Eggs are laid in sticky masses in fast flowing water and hatching take a few days in warm condition on river floor. The mature larvae are poorly segmented, lightly colored and distinguishable by a blackish head with a prominent pair of feeding brushes. Larval maturation takes from several weeks to months and in some species larvae can overwinter. Pupation takes place in a slipper-shaped brownish cocoon (3). The pupa has respiratory gills projecting from the cocoon (3). After the 2-6 day pupal period, there is a mass emergence of adult flies. Typically longevity of adult black flies ranges from 2-3 weeks to as long as 25 days (2).

Adult flies feed on plant nectar, but in most species females require a blood-meal to obtain the protein necessary to mature their eggs (1). They are particularly active during the morning and evening. In temperate regions they may be regarded seasonal since adults die in autumn with new

generations in spring and summer. Adults are strong fliers and are highly responsive to carbon dioxide and other host odors (2). Geographically these flies have worldwide distribution except some areas of the tropics like New Zealand, Hawaii and some minor island groups which are rendered uninhabitable by *Simulium* (2). They may fly in high densities as many as 6.5-12.8 km in search of a host. The saliva secreted by fly as they feed may cause allergic responses in the host (1). *Simulium* spp. may transmit different microorganisms to human and animal hosts; e.g. the virus causing vesicular stomatitis and the avian protozoan *Leucocytozoon*. They also act as vectors for filaroid helminthes *Dirofilaria*, *Onchocerca*, *Mansonella* and *Splendofilaria* in humans, bears, cattle, ducks and goose (2, 3).

CASE REPORT

A 32-year-old man from Khorram Abad city in Lorestan province, Iran, while camping in Gahar (around the mentioned city) was attacked by a mass of blackflies (figure 1). Few hours after, very sensitive pruritic red wheals appeared in the biting sites (figure 2). The lesions were present mainly on the lower legs and randomly distributed. They were pruritic for 2 weeks and healed without any treatment after 20-25 days. Dermatitis which is defined as superficial inflammation of the skin, characterized by redness, edema and usually itching (4) was diagnosed. The reaction is assumed to be type I hypersensitivity reaction due to the release of pharmacologically active substances which lead to vasodilatation and increased capillary permeability.

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The patient had no predisposing disease and his blood group was A.

Figure 1

Figure 1: Adult fly (×40)



Figure 2

Figure 2: The lesions on the lower leg. Note the around the biting sites.



Figure 3



DISCUSSION

Simulium flies are of medical and veterinary importance. Haematophagous female blackflies (Diptera: Simuliidae) are serious biting pests and obligate vectors of vertebrate pathogens, namely filarial *Dirofilaria*, *Mansonella*,

Onchocerca and avian protozoa *Leucocytozoon* (3). Only the adult females are blood-feeders and different species have different preferred feeding sites. Most species are particularly active during morning and evening in cloudy, warm weather. The adults are found in swarms near free running and well aerated streams. From a medical perspective Simuliidae are particularly important as vector of filaroid nematode *Onchocerca volvulus*, which causes “river blindness” in humans in Africa, Central and South America. *Mansonella urzadi* may be transmitted via these flies to humans.

Blackflies of the genus *Simulium* that are vectors of *Onchocerca volvulus* are:

- The *Simulium damnosum* complex (Africa and South Arabia) which was formerly considered to be a fairly uniform species, but chromosomal investigations have shown it to be a complex of subgroups. *S. damnosum* breeds in a wide variety of watercourses in different climatic zones: from very large rivers to medium-sized streams. The main factors governing its breeding places are adequate water velocity (0.70 to 1.50 m/sec), which is linked with oxygenation and food supply, and the presence of suitable supports, which may be rocks, stones, sills, sidewalls of structures, spillways, gates;
- The *S. naevi* group (East Africa) includes species which larvae and pupae attach themselves to riverine crabs (*Potomonautes* sp.) as support. Within the group, four species have so far been distinguished. None of them breeds in large rivers, even if suitable crabs are present, but in small watercourses in forested areas;
- *S. ochraceum*. This is the principal vector in southern Mexico and Guatemala, and is widely distributed in central and northern parts of South America. Larval habitats consist of trickles of flowing water and very small streams, often concealed by vegetation and fallen leaves (e.g. in coffee plantations) (6).

There is an important difference between the biting habits of African and American species. The African *Simulium* bites mainly on the legs and the lower part of the body, whereas American species prefer to bite on the head and the upper part of the body (6).

The flies' bites are seriously painful and due to the release of pharmacologically active substances such as histamine, leukotrienes, prostaglandins, platelet activating factor and eosinophilic chemotactic factor (ECF) from IgE-sensitized

basophils and mast cells after contact with antigens in the flies' saliva acute urticaria, which is one of the disorders due to hypersensitivity may occur. The condition is characterized by local wheals and erythema in the dermis can be due. In urticaria pruritis is the first symptom followed by the appearance of wheals. Acute urticaria is a self-limited condition and treatment is palliative. In hypersensitive persons bites can be fatal (4).

One of the few studies on blackfly distribution in Middle East by Crosskey 17 species belonging to 3 genera and 7 subgenera were identified from Iran and Iraq in 1970-1980 (7). The flies were isolated from Alborz Mountain, Kordestan and few regions near Caspian Sea. The isolated species in this study were as follows:

Simulium pseudoequinum, *S. paraequinum*, *S. lineatum*, *S. variegatum*, *S. kiritshenkoi*, *S. fontanum*, *S. bezzii*, *S. transcaspicum*, *S. brevitrase*, *S. assadovi*, *S. paucicuspis*, *S. branchyantherum*.

2 other species *Metacnephia persica* and *Sulcicnephia znoikoi* were isolated from Iran. 3 species which were isolated from Iraq were not found in Iran including *S. dahestanicum*, *S. ruficorne* and *S. buxtoni*. Regarding the long common border between these two countries these and some other species could be expected in Iran as well as Iraq (7). In Lebanon there was a study in 1985 by Giudicelli and Dia in which 5 species of *Simulium* flies were reported (8).

Blackfly control is extremely difficult because of their small size and since the immature larvae are found in running water. The most practical control method is the application of insecticides to breeding sites in example application of organophosphate insecticides to water-courses which is then carried downstream and kills larvae (1, 2). The development of blackfly control in South Africa during the 1960s blackflies in the Vaal River was primarily with DDT; during the 1970s and into the 1980s blackflies were controlled using water-flow manipulation; when used at strategic times, water-flow manipulation could be used to enhance the effect of natural predator populations; and during the 1990s the organophosphate temephos and toxins produced by the bacterium *Bacillus thuringiensis* var. *israelensis* were tested for their efficacy against blackflies. The larvicides temephos and *B. thuringiensis* proved to be effective and are still used in several control programs (9). Because of the important role of blackflies in the mechanical and biological transmission of human, cattle, horses, turkeys and other animals pathogenic organisms, defining its distribution in Iran is a of

great significance. Specifying Simulium dispersal and identifying the regions affected by these flies would be helpful in recognition of the disease agents carried by them in our country (10, 11).

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Author Information

M.R. Youssefi

PhD student in Veterinary parasitology, Faculty of Veterinary Medicine, University of Tehran, (Also: Islamic Azad University Babol - Branch)

A. Aminpour

PhD student in Veterinary parasitology, Faculty of Veterinary Medicine, University of Tehran

F. Arabkhazaeli

PhD student in Veterinary parasitology, Faculty of Veterinary Medicine, University of Tehran