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Identification of a Red "Fiber": Chironomid Larvae

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ABSTRACT: During preliminary examination of the body of a homicide victim, a peculiar red "fiber" was noticed and recovered. Initially believing this to be a carpet fiber, the item was subjected to fiber analysis. It was found to be a short coiled particle not like any known natural or synthetic fabric fiber. Subsequent examinations determined this "fiber" to be the larva of a common freshwater midge (Diptera; Chironomidae).

Chironomid larvae have been observed on other bodies recovered from freshwater environments. Entomological studies of this organism have led to the conclusion that the presence of chironomid larvae indicates submersion of the body.

KEYWORDS: pathology and biology, entomology, insects, postmortem interval, decomposition, carrion insects

Case 1

A 21-year-old male was found dead, floating in a freshwater stream in an urban area. He had been killed by impalement per rectum onto a 3-ft (0.9-m) length of pipe. The palus was still in place in the partly dressed body. Preliminary examination disclosed the presence of a few 3- to 5-mm coiled translucent red strands or "fibers" on the clothing and skin (Fig. 1) [1].

Case 2

One year later, an unidentified adult female was found floating in a farm drainage ditch. She had been killed by blows to the face with aspiration of blood. Preliminary examination of the partly clothed body again disclosed similar translucent red "fibers." This time, a forensic entomologist was at hand and recognized these red "fibers" as insect larvae, having previously seen such larvae on a submerged body (Fig. 2).

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FIG. 1—A translucent red strand or "fiber" on the clothing of the victim in Case 1.



FIG. 2—Red "fibers" on the back of the victim from Case 2 which were recognized as *Chironomidae* larvae.

Method

The red "fibers" described in Case 1 had been collected by removing the dry specimens from the body and placing them into a plastic petri dish [2]. The dish was sealed with cellophane tape. They were stored dry at room temperature in the property room until used for analysis. When analyzed, these "fibers" were described as red, white, blue, and clear, consisting of what appeared to be natural substance but of unknown origin. It is possible that all of these "fibers" could have been chironomid larvae because of the colors described, but the red "fibers" were undoubtedly the larvae of chironomid flies (midges). Midge larvae consist mainly of water, so drying the larvae could shrink the body forms as much as 50 to 75% of their original length and width, thus distorting the larvae greatly from their natural appearance. The hardened head capsule, on the other hand, would retain its shape and would be recognizable to a trained entomologist.

The specimens described in Case 2 were collected at the site where the body was found and immediately preserved in 75% ethyl alcohol. Immediate identification was made by visual inspection based on the characteristic size, shape, color, and consistency. Sight identification was then confirmed by microscopic taxonomic examination [3-11].

Discussion

The larvae of Chironomidae are small and worm-like, ranging in size from approximately 1 to 30 mm; they may be white, brown, green, yellow, purple, pink, red, or transparent in color. The fine structure of the body is demonstrated by low-power scanning electron microscopy (Fig. 3). The head capsule (Fig. 4) is sclerotized with well-developed antennae and lateral eyespots. The rest of the body is soft. There are no thoracic legs, but there are usually prolegs on the first segment of the thorax and the last segment of the abdomen.

The larvae shown in Figs. 1 and 2 are the larvae of chironomid flies. Certain genera of the group Chironomidae produce larvae that are blood red in color and are sometimes colloquially called "bloodworms." The chironomid flies have an aquatic life cycle. The larvae feed on detritus, algae, or other food sources and may be found on submerged bodies of humans

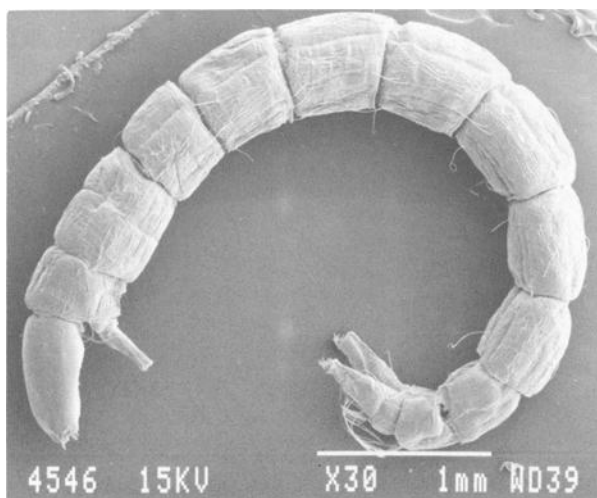


FIG. 3—Scanning electron micrograph ($\times 30$) showing the body structures of the chironomid larvae.

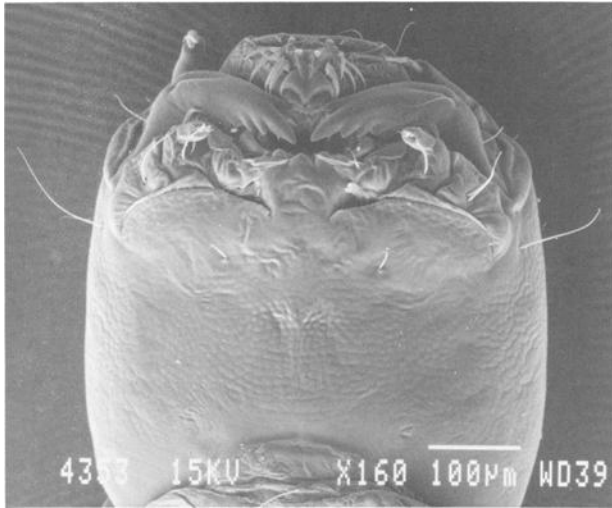


FIG. 4—Scanning electron micrograph ($\times 160$) showing the well-developed sclerotized head capsule of a chironomid larvae.

or other large animals. The stage of development of chironomid larvae may be useful in estimating the duration of submersion, if accurate life cycle data is available for the species present.

It is relatively easy for a person inexperienced in entomology to sight identify the chironomid larvae with the aid of a hand lense. The difficulty arises when the generic level identification is attempted. These determinations should be left to experienced entomologists who have worked with aquatic insects.

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