CASE REPORT

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Implications of Trombiculid Mite Bites: Report of a Case and Submission of Evidence in a Murder Trial

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ABSTRACT: Bites of Trombiculid mites implicated a suspect during a homicide investigation. Clinical documentation of the bites, correlation with entomological studies, and submission of evidence at trial are reported. Insects that have a discrete geographic distribution and leave bites of a characteristic nature may have important forensic science implications.

KEYWORDS: pathology and biology, criminalistics, entomology, forensic dermatology, chigger dermatitis

Forensic entomology has principally been concerned with the insect fauna of cadavers. Studies that have proven to be useful in forensic science investigations are those involving the succession of adult insect forms and characterization of the developmental stages of their offspring [*1*], particularly the sarcosaphrophagous insects [*2*]. Entomological data have been helpful in determining the time of death under circumstances in which a body has been exposed, submerged, buried, or moved from one site to another [*3*].

Insects that parasitize or bite living persons have not been particularly useful as forensic science indicators, presumably because of their ubiquity and the often nonspecific cutaneous manifestations of their bites. Those that have a limited distribution and leave characteristic bites, however, could prove useful during medicolegal investigations.

This report describes an unusual occurrence in which the bites of larva belonging to the genus *Eutrombicula* implicated a suspect and later proved to be important in a subsequent conviction by jury on charges of first-degree murder and forcible rape. Clinical evaluation suggested the origin of the bites, and subsequent detailed entomological studies cor-

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roborated the diagnosis. The entomological studies have been previously reported elsewhere [4]. Clinical evaluation of the dermatologic findings, correlation with insect fauna at the murder scene, documentation of evidence, and submission at trial are summarized here.

Case Report

While conducting a ground search near an abandoned vehicle on 5 Aug. 1982, a Search and Rescue Team in Ventura County, CA, discovered the body of a young woman, partially covered with plant debris. The ground on which she was found was on an incline beneath a large eucalyptus tree, abutting a flat plain covered with wild oats (Fig. 1). Because homicide investigators reached the scene in the darkness during late evening hours, removal of the body was postponed for 6 h until early the following day, at which time debris overlying the body was carefully removed and the immediate surrounding area was thoroughly searched.

A complete autopsy of the body disclosed imprinting of fabric weave into the skin of the neck. There was marked vascular congestion with submucosal hemorrhages in the glottis and arytenoepiglottic folds. Internally there were numerous contusions on the galea with scant subdural hemorrhages and minimal subarachnoid hemorrhage. A rare spermatozoae was seen on a vaginal smear. The skin was free of any evidence of insect bites.

FIG. 1—*Aerial view of murder scene. The body was found on incline beneath and to the right of eucalyptus tree* (arrow). *Note that field of grass abuts incline where native growth begins.*

An individual who was being questioned in the investigation on 6 Aug., and subsequently arrested, was noted by the detective to have a larger number of excoriated bites on his torso and buttocks.

Approximately 24 h following removal of the body from the murder scene, on 7 Aug., the detective in charge of the investigation experienced severe itching. He noted a large number of intensely pruritic lesions located on the lateral aspect of either hip and on his legs below the level of the boot tops, but none on the exposed areas of his body.

Forty-eight hours after the bites were first noted, on 9 Aug., clinical examination of the detective revealed a large number of papular lesions which measured 2 to 5 mm in diameter in their entirety. In the center of each papule that had not been excoriated, there was a small vesicular punctum, measuring approximately 1 mm (Fig. 2). On those that had been excoriated, there was a central umbilicated area of ecchymosis with a 1- to 2-mm area of purplish discoloration forming a halo around the papule. The lesions were limited in distribution to areas where clothing had been tightly applied, specifically underneath a gun holster on one hip, well below the waistline on the opposite side and well below the level of high-top boots. Interviews with search and rescue team members who had been at the scene revealed that the majority had sustained similar pruritic bites.

On the same day, 9 Aug., the individual previously questioned and arrested, and now the principle suspect, was examined. A large number of pink-to-red papular lesions were found, measuring 3 to 6 mm in overall diameter. Some of the lesions had a central punctum, but the majority had been excoriated and the center was umbilicated with an overlying purple-to-black eschar, measuring 1 to 2 mm in diameter. An ecchymotic halo was noted in some of the more excoriated lesions, but there was no evidence of definite secondary infection. The distribution of the lesions is shown in Fig. 3. As was found on examination of the detective, there were no lesions on exposed areas of the suspect. Because of a previous experience in another state, of having been bitten extensively by chigger mites, the detective theorized that this organism had inflicted the bites he received while investigating the murder scene. It had been presumed that chigger mites do not exist in Southern California; yet since the clinical

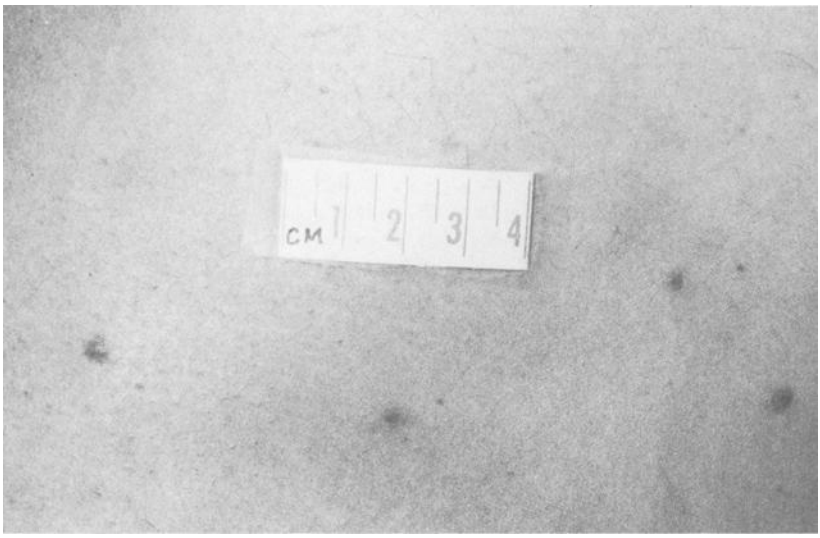

FIG. 2—*Lesions from chigger mites. Police officer was bitten while at murder scene 72 h before photo was taken.*

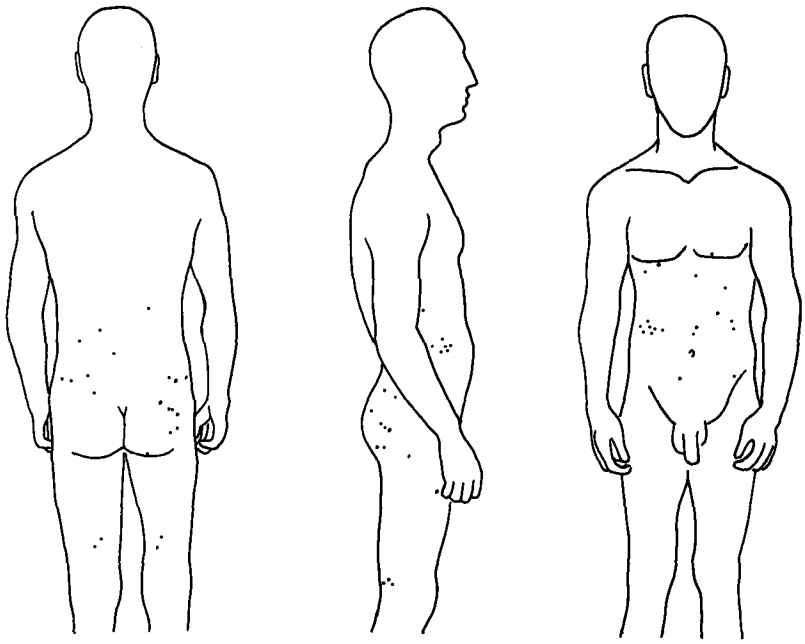

FIG. 3—*Distribution of mite bites on suspect. Note that the lesions are confined to nonexposed dermis.*

appearance of the bites was believed to be diagnostic, a team of entomologists was consulted, and they performed a detailed study of the murder scene [*4*]. A large number of the chigger mite *Eutrombicula belkini* were removed from a number of vertebrate hosts including lizards, wood rats, deer mice, and pocket mice, and recovered by black plate sampling. Large numbers of biting chigger mite larva were also removed from the clothing and skin of the entomologists.

In October 1982, a preliminary hearing was held and the clinical and entomological data were presented. Although there was some circumstantial evidence including prior sexual assaults, there was little other physical evidence linking the suspect to the murder site. Clinical examination had revealed that the detective's bites were received at the murder scene approximately 48 h after the murder occurred, while those of the suspect appeared to be approximately 48 h older. The suspect's bites were therefore thought to have been sustained at the time the murder occurred. The suspect was held to answer, and the trial commenced in February 1983. The clinical findings were graphically presented by 8 × 10 color photographs of the lesions on both the detective and the suspect. Expert testimony concerning the entomological findings was also presented. The suspect was found guilty of rape-homicide, and he was sentenced to life imprisonment without possibility of parole.

Discussion

The accidental or fortuitous interaction of man with the *Insecta* has historically been of great medical and economic importance. Whereas the foundation of forensic entomology has previously been primarily involved with a study of the process of decay [*1*], the current case encourages an expanded view. After a careful search of the literature, similar cases

wherein interaction of insects with a living suspect had such relevant application could not be found.

Man is not the primary host for the more than 200 families of known parasitic mites. The chigger mite (*Trombiculidae*), however, is an accidental parasite of man. Only the larval form attacks man, while the later stages of development of these insects feed on invertebrates or arthropod eggs [*5*]. Species of the subgenera *Eutrombicula* are the most important dermatitis-producing chigger mites that attack in California. Chigger mites are most likely to be encountered in fall or summer by those venturing out-of-doors, particularly at the edges of a forest or at margins of farmlands and native floral growth. Population of these insects may be confined to quite concentrated areas, being limited to distinct and rather small ecological niches.

The dermatoses associated with mite infestations have recently been extensively reviewed by Krinski [*6*]. The dermatitis induced by chigger bites is found most characteristically *under* clothing and specifically under areas of constriction formed by undergarments (belts, boots, and so forth), or by folds of skin such as the axilla or the popliteal fossa. Bites on exposed surfaces such as the neck, face, or upper extremities are very unusual. Reaction to chigger bites evolves usually within 24 h and commonly is first noted under warm covers at night [*7*]. The initial lesion is a pink papule 4 to 6 mm in diameter with a paler central punctum. Over the succeeding days, the inflammation and pruritis progress, the papule becomes deeper pink-to-red, and the conical center becomes vesicular. The vesical may be opened by scratching, after which it exudes a clear serous exudate. The lesions may become purpuric, and the center may be covered with an eschar. As with any pruritic dermatitis, secondary infection may occur. Histiopathological study may reveal a feeding canal or stylostome within the epidermis, a diagnostic feature characteristic of bites inflicted by the Trombiculid mites [*8,9*].

Although the role of hypersensitivity has not been studied in detail, clinical observation has documented that immediate hypersensitivity may develop after re-exposure, as evidenced by wheal and flare reactions within minutes to hours of the bite [*10*].

The identification of any of the nonburrowing mite-induced dermatoses may be very difficult [*11*]. In the case of chigger bites, the distribution of the lesions and the histological findings may be diagnostic. Confirmation rests upon discovery and speciation of the offending organism.

With respect to the case reported herein, the detective in charge of the homicide investigation suspected that chigger mites produced the pruritic lesions on himself and those identified on the suspect. Subsequent clinical examination of both individuals confirmed this impression, and the diagnosis of chigger mite dermatitis was made, despite the previous presumption that chigger mites did not exist in Ventura County or anywhere else in the southern portion of California. Entomologists with a particular expertise in ectoparasitology were therefore contacted and it was discovered that actively feeding *Eutrombicula belkini* larvae were present at the homicide scene.

Three species of chigger mites are known to attack man in California: *Eutrombicula alfreddugesi, E. belkini,* and *E. batata*. No instance had previously been recorded of chiggers attacking man in Ventura County. A single instance of *E. belkini* attacking man in Los Angeles County was recorded by Gould in 1950 [*12*], who also reported, in the same publication, that specimens of *E. belkini* were collected from a reptile host in Ventura County.

On the basis of police, autopsy, clinical, and entomological investigations, it was concluded that the suspect must have been at the murder scene where the victim was raped, beaten, and asphyxiated. While covering the body with dried grasses and other debris from the field's edge, he was bitten by *E. belkini* larvae. No lesions were found on the body of the victim because she had died before bites could elicit any cutaneous reactions. Investigators

exhuming the site 24 to 36 h later were also bitten. The suspect had admitted being with the murder victim on the last evening she was seen, 3 Aug. He reported that they had parted, but denied any responsibility for or knowledge of her death; most importantly, he denied having been anywhere near the scene where the body was found.

The defense attorney presented evidence suggesting the bites could be attributed to a number or parasites, possibly fleas infesting the defendant's dog. A defense expert claimed the source of the bites could not be determined from photographs or visual observation, but only by a biopsy which the suspect had refused—a refusal not admissible as evidence. The distribution of lesions resulting from flea bites (on ankles, legs, and exposed parts of the body rather than *under* areas of constriction from clothing) was distinguished from the distribution of chigger bites by the prosecution's witness. The rarity of chigger mites in Ventura County [*4*] reasonably excluded the possibility of the suspect having been bitten at some site other than the murder scene. The jury, after the guilty verdict, reported that they considered the clinical and entomological data to be convincing and a major piece of evidence in their verdict.

Current entomological knowledge and techniques, critical tools in the resolution of this case, may be found to have a wider application in forensic science investigations if dermatologic findings or other evidence of insect contact are pursued.

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