Insects and Other Arthropods as Related to Human Health in Minnesota

In Minnesota, insects and their relatives within the Phylum Arthropoda* are medically important to humans more as direct agents of discomfort or injury than as vectors of disease-producing organisms. This is primarily due to the fact that the State is situated in a northerly region characterized by extremes of temperatures.

Tularemia, or rabbit fever, a bacterial infection which occurs in Minnesota, may be passed by the bite of an infected tick or mechanically inoculated by the contaminated mouthparts of some bloodsucking insect. However, it is more often contracted by handling carcasses of infected rabbits. Meadow mice and other rodents may also harbor the organism. Plague, another bacterial disease maintained by various fleas in a vast rodent reservoir in the western half of the United States, has not been recorded in Minnesota but is found in adjoining western states. It is therefore possible that this organism may now exist undetected in Minnesota, constituting a potential hazard.

A rickettsial infection, Rocky Mountain spotted fever, occurs generally throughout the continental United States, with Minnesota no exception. The etiological agent is passed primarily in the saliva of a feeding infected tick; however, the number of recognized indigenous cases in the central states is relatively low. The last cases recorded in Minnesota were two in 1961.

Probably the most significant arthropod-borne infection of humans in Minnesota is Western encephalitis, produced by a virus carried by certain mosquitoes, presumably from a bird or other wild animal reservoir to humans and horses. This disease was of great importance around 1940 when a large number of cases occurred among humans and horses; but in recent years only a few infections have been noted. A second mosquito-borne arbovirus, that of St. Louis encephalitis, also occurs in Minnesota; but no human illness ascribed to this cause has been reported.

A large group of flies, typified by the house fly, Musca domestica, possesses a sponging type of mouthparts, making them incapable of piercing and drawing blood. These flies may nonetheless become contaminated with any of a number of pathogenic microorganisms. This is especially true for flies that visit fecal materials or feed on exudates from wounds, eyes, or the like. They may either carry organisms externally from such a source or ingest organisms which then may be passed in a viable state via vomitus or feces.

The only insect-transmitted worm that might infect humans in Minnesota, aside from a remote possibility of a tapeworm infection, is the dog heartworm, Dirofilaria immitis. This worm is common in dogs and related hosts, especially in the Twin City area, and is presumably carried from host to host by mosquitoes. Although humans are fortunately not suitable for development of adult worms, there have been several instances recorded of apparently asymptomatic encapsulation of larval worms in human tissue. The broad fish tapeworm, Dibothriocephalus latus, also present in Minnesota, utilizes a crustacean early in its larval cycle, but the ultimate infection in man is from the fish, not the arthropod.

It is thus evident that the probability of contracting a pathogen from an arthropod is rather remote. Our primary concern, therefore, is with the direct effects insects may have on man. Minnesota is “blessed” with an over-abundance of bloodsucking flies, notably mosquitoes, black flies, horse flies, deer flies, punkies, and stable flies. With reference to mosquitoes, a noted entomologist, over 80 years ago, said, “The bravest man on the fleetest horse dares not cross some of the more rank and dark prairies of Northern Minnesota in June.” This statement is as appropriate today as then and could well be expanded to include more than mosquitoes. When these bloodsucking flies feed, they inject a salivary secretion, and the reaction to this bite may vary from virtually none, to itching, to marked swelling around the site of the bite, and in some instances to a more extreme type of response which may require medical attention.

Certain ectoparasitic insects may need a more prolonged and intimate contact with man than the bloodsucking flies. Humans have two species

*See Test Your Word Score Page 1227.
of lice—the human louse, Pediculus humanus (with body and head subspecies), and the crab louse, Phthirius pubis—restricted to man alone, living on or near the host and taking several blood meals a day. Bedbugs and fleas are not overly host-specific and will suck human blood if the opportunity presents itself.

The American dog tick or Eastern wood tick, Dermacentor variabilis, is extremely common in Minnesota, with the unfed overwintering female and male attaching to humans, as well as to other animals, in the spring and early summer. This tick is virtually the only tick in the State likely to be found attached to humans. Aside from the bite itself and possible secondary infection, this tick is responsible for producing tick paralysis in areas of the eastern United States, but apparently not in Minnesota. The chicken mite (Demodex gallinae), the northern fowl mite (Ornithoconus sylviarum), and the tropical rat mite (Ornithonyssus bacoti) may occasionally stray from their normal hosts and feed on man, producing a dermatitis. The North American chigger mite (Trombicula alfreddugesi) occurs at least in the southern half of Minnesota, and the bite of its parasitic larval stage results in an intense itchy and the production of a reddish papule with a minute hemorrhagic center; the bites are found especially on areas where there is clothing pressure, such as under belts or socks.

In the United States there are very few species of spiders venomous to humans, but one of these is Latrodectus mactans, the black widow. This spider occurs in Minnesota, although it may be more prevalent in other parts of the United States. Occasional poisonings from the bite of the female may occur in Minnesota.

A number of hymenopterous insects, such as bees, wasps, hornets, yellow jackets, or velvet ants, may sting man by means of a specialized ovipositor, and, by so doing, inject a venom. The reaction of man to these stings again varies widely, all the way from a transitory pain to rapid collapse and death. Although deaths are rare in proportion to the numbers stung, almost twice as many people die in the United States from bee and wasp stings as from snake bites.

Cases of myiasis—invasion of organs and tissues of man by fly larvae—are occasionally encountered in Minnesota. A skin maggot fly, Wohlfahrtia vigil, may deposit a clutch of larvae directly on the human skin, especially of very young children; these larvae will enter and excavate in the skin. Larvae of other assorted species of flies may be classed as occasional invaders of the intestinal tract or secondary invaders of wounds or natural cavities; but, as this is not their normal habitat, the observation of viable fly maggots in a freshly passed stool may cause considerable alarm. Larvae of cattle warble flies, Hypoderma species, and horse bot flies, Gasterophilus species, while normally restricted to living within their livestock hosts, have been recorded from man. Since these flies exist in Minnesota, an occasional human infection may occur.

There are certainly other ways arthropods may affect humans. Some people who have become sensitized to insect particles may develop an allergic response; an asthmatic attack produced by inhalation of air-borne setae and scales of moths is illustrative of this. Accidental injury may occur to sense organs following collision with or entry by any of a number of insects.

There are a few people who suffer from hallucinations and develop extreme anxieties regarding imagined insect or arthropod attack. These people, suffering from what is termed "entomophobia" or "delusory parasitosis," present a real challenge to those attempting diagnosis and treatment.

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