CLOSE ENCOUNTERS OF THE WORST KIND

Just about everyone, we imagine, is familiar with the recurring science fiction theme of a devastating attack on our planet by some alien life-form. The attackers possess such formidable weapons that their victory over the human race seems totally inescapable. Only the last-minute detection of a fatal weakness in the attackers enables the desperate human defenders to save the day.

Now it may be that we are exaggerating a little, but we maintain that there are distinct similarities between this scenario and the attack we have been undergoing for the last several weeks. We refer, of course, to the annual onslaught of mosquitoes. Some proud survivors of previous attacks belittle the seriousness of the current one by pointing out that of the world's 3000 kinds of mosquitoes, only about 25 are found in the Park. They go on to point out that only about six of these 25 ever attack humans, that even then it is just the females which bite, and that they only take two or three milligrams of blood—hardly a great quantity.

We concede the truth of these statements but, frankly, we are not impressed by them. The individuals that bite may be a small minority of all mosquitoes, but it really doesn't matter; they are still so numerous that they constitute a definite threat, if not to our lives, then certainly to our enjoyment of the outdoors.

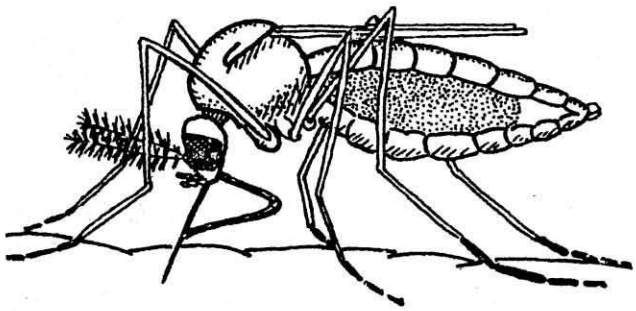
To those of you who share our view about the gravity of the present situation, we submit that our only hope lies in following the strategy employed in all the science fiction stories: we must carefully study the pesky aliens in an effort to find some weakness which we can exploit. The rallying cry must be, "Know thine enemy!"

The first step is to watch a mosquito stick it to you. (It may go against the grain but, let's face it, lots are going to get you no matter what you do, so you may as well watch one.) You have to admit, however grudgingly, that mosquitoes are marvelously well adapted for their way of life. In most cases they land so lightly that you don't even know it, and within seconds they are penetrating your skin. If you look closely, you will see two parts to the feeding apparatus. There is a larger, outer sheath which is not inserted in your skin but is bent back like a hairpin during feeding, and a more slender tube which is inserted straight down for about half its length into your skin. Actually, this feeding tube consists of six separate parts. These include a large tube for drawing your blood up, a much smaller tube for sending saliva down (to prevent your blood from coagulating), and two structures with fine teeth on their edges which the mosquito uses to literally saw its way down into your skin. For even the most thick-skinned human, a mosquito takes no more than 50 seconds to insert its feeding tube, another 2 1/2 minutes to "fill er up," and a mere five seconds to withdraw the tube and make its getaway.

If you always terminate your observations at this point by obliterating the mosquito you get no marks for scientific detachment, and you will have to settle for the smug satisfaction stemming from the act of paying one back. It must be admitted also that there isn't much to be gained by watching a mosquito taking your blood with impunity because no-one has yet found an exploitable weakness in this part of the mosquito's behavior.

For example, mosquito repellents do not work by giving you a bad taste or smell that dissuades a mosquito from inserting its feeding tube into your skin. Rather, they work by jamming the mosquito's detection system and deflecting the potential attacker before it lands in the first place. To understand how this happens we must first understand how mosquitoes find us and, thanks to many years of research, we now know the basic sequence of events.

More often than not, even a hungry female mosquito rests on vegetation and does not fly very often. Even a small local increase in carbon dioxide, however, such as one caused by a passing animal, causes the mosquito to take flight and fly about more or less randomly. If she encounters



a warm, moist convection current, given off by all warm-blooded animals, the mosquito will quickly fly "upwind" and perhaps encounter the source. Of course, a mosquito can't see a convection current any better than we can and she may very well fly out of the current by mistake and lose the trail. When this happens, however, the sudden decrease in air moisture is detected by special sensors on the mosquito's antennae, and this causes the mosquito to turn. The chances are reasonably good that she will then fly into the same or another moist convection current and she will once again be on the right track.

When the potential victim is one of us (the good guys), liberally doused with repellent, the sequence is altered. At first, things are not too encouraging because repellents actually cause resting mosquitoes to take flight, just the way carbon dioxide does. In other words, the repellent actually helps alert mosquitoes to our presence and makes it more likely they will find our convection current trail. As they make their final approach, however, the moisture sensors are jammed by the repellent vapor coming off our skin. What this means is that even if the air moisture is increasing (as it does close to our skin), the sensors detect less moisture, just as they would if the mosquito had flown out of a moist convection current.