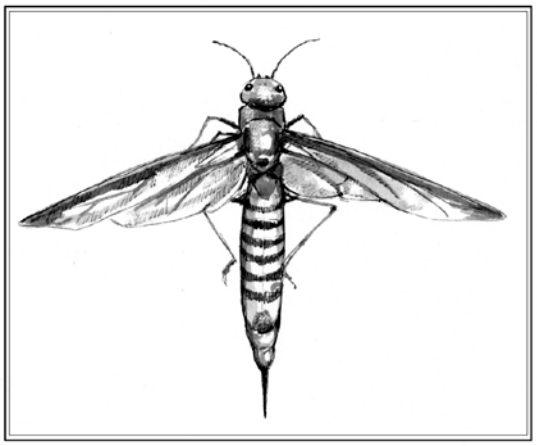
The Outside Story



The Wasp and the Fungus

By: Eric R. Eaton

No one could fault you for running away, screaming in terror, if you saw a large, flying, cigar-shaped insect armed with a "stinger" bigger than a sewing needle. Thankfully, the female pigeon horntail wood wasp is harmless. That spear on its rear isn't meant to pierce skin. It's for drilling into wood; and it lays the foundation – literally – for a remarkable inter-species relationship.

Tremex columba is the scientific name for this member of the Siricidae family. Adult females measure one and a half to two inches, males slightly smaller. The female's "stinger" is actually a specialized egg-laying organ called an ovipositor. This slender, hollow rod is divided top to bottom, both halves articulated. Serrations on the tip allow the wasp to saw into tree trunks, much like an electric knife cuts meat. Two additional segments on either side sandwich the ovipositor in a protective sheath. The whole apparatus originates midway down the underside of the wasp's abdomen.

Horntails get their name not from the ovipositor, but from a knob or spur at the tip of the abdomen *above* the ovipositor in females, but present in both genders. This "cornus" is a feature of the larva, too, aiding the grub in locomotion.

A fertile female pigeon horntail seeks a tree that is dead, dying, or weakened. Maple and beech are preferred hosts, but elm, apple, poplar, oaks, and other hardwoods are also targets. Once she selects a tree, she begins drilling in the manner described above. Foresters call the wasps "stump stabbers" in reference to this behavior. She lays two to seven eggs at a time at a depth of about three-fourths of an inch. She then extracts her ovipositor and repeats the process, elsewhere on the same tree, and/or in other trees.

At the same time she lays her eggs, she deposits the spores of a wood-rotting fungus, *Cerrena unicolor*. These spores are stored in two mucus-filled pouches near the base of her ovipositor. As the fungus grows in the tree, it secretes enzymes that break down cellulose. This partly digested wood is consumed by the horntail larvae; female larvae store the fungal strands in pockets that will become the mucus pouches in the adult wasps. As the larvae grow, they bore tunnels through sapwood and heartwood, fifteen centimeters to two meters or more in length, curving towards the exterior surface of the tree.

The wasp and fungus are mutually supportive. The fungus benefits by hitching a ride to new host trees, where it can spread and ultimately produce fruiting bodies - shelf mushrooms known as mossy maze polypore. The wasp depends on the fungus to complete its life cycle. Without *Cerrena unicolor* to provide

food and soften wood, pigeon horntail larvae do not survive.

There is, however, reason to suspect the relationship has a dark side. The fungus may play a role in attracting parasitic wasps that reduce the horntail larvae's numbers. A larva tunneling inside a tree would seem to be safe from enemies, but there are other wasps that have evolved to seek out horntail grubs. Female giant ichneumon wasps in the genus *Megarhyssa* have long, whip-like ovipositors that drill deep to attach an egg to a horntail grub. Wasps in the Ibaliidae family reach young horntail larvae at a more shallow depth. Ichneumon larvae feed externally on nearly mature horntail larvae. Ibaliid larvae feed internally initially, externally later.

Scientists have discovered that, in the case of other species of horntail wasps, fungal associates can attract these parasites. *Ibalia* is attracted to volatile chemicals released by the fungus in its early stages of development ahead of the horntail larva's feeding tunnel. Ichneumon wasps are drawn to fungal chemicals excreted in the horntail grub's feces.

A pigeon horntail that survives the perils of youth eventually becomes a pupa, the "resting stage" in which it transforms into an adult. Adult horntails chew their way out of their host trees between June and October in the northeast U.S. Males emerge before females, gathering in loose swarms over treetops. Females look for these "bachelor" parties and select suitable mates.

While they are not uncommon, horntails tend to fly overhead, out of our usual lines of sight. Look for females ovipositing on trees. As for *Cerrena unicolor*, you can find its fruiting body, mossy maze polypore, in any season. Look for a white or gray shelf mushroom typically covered with green algal bands.

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