Gypsy Moth Research Takes 'Think Tank' Approach

UNIVERSITY PARK, (Centre Co.) — Contrary to the fictional adventures of the brilliant detective Sherlock Holmes, the more people you have working on an investigation, the better the results. That same thinking is what drives the scientists at the Gypsy Moth Research Center at Penn State to study the forest pest through the prism of their own expertise to gain a clearer image of what makes the insect function.

"No one has the foggiest idea why the gypsy moth does what it does," says Jack Schultz, professor of entomology in the College of Agricultural Sciences and head of the center. "The ability of this insect to go from populations that are very small to an outbreak of millions is one of the great mysteries of biology."

Working on that mystery are nine scientists in the department of entomology with wide-ranging areas of expertise. By sharing research and networking new discoveries, this loosely organized group can not only clarify how the gypsy moth functions but also try to apply that new information to other insect applications.

"High quality science seeks generalization," Schultz says. "The amount of collaboration that goes on at Penn State allows us to work on solutions that go from the molecular level to the landscape level. That kind of perspective is pretty unusual in entomology."

Schultz says banding together the research of nine scientists can get tricky, especially since the nature of science and academic reward is often tied to individual achievement.

"The temptation is to always make your way in the scientific world by specializing," Schultz explains. "We try to tap into people's desire to attack and solve complicated problems and make that into a teamwork philosophy."

The formation of the center at Penn State is particularly apt because the state's hardwood forest is a prime target for the pest. "We are sitting right in the middle of a forest that is like candy for gypsy moths," Schultz says.

Although the group is called a research center, its members are as far-flung as, well, gypsy moths. Some of the team work in a laboratory away from central campus, and others have offices in the Agricultural Sciences and Industry building. Schultz credits contemporary technology with keeping the group focused on its goals.

"Electronic mail has helped us tremendously," Schultz says. "At a large university, you can play telephone tag for weeks without contacting another researcher. With E-mail, everybody has new information in a matter of hours."

By keeping the center collaborative, yet loosely structured, each researcher also can pursue specialized interests. "I think people like to run their own show, but it's crucial to stick your head out of the gypsy moth mire and see what's going on around you" Schultz says.

For example, William McCarthy, associate professor of entomology and a molecular biologist, studies how pesticides attach to the gut of a gypsy moth. He often collaborates with Schultz and Heidi Appel, a research associate in entomology, to research wilt disease, a viral infection of gypsy moth caterpillars.

Another collaborative effort between Michael Foster, research associate in entomology, and Michael Saunders, associate professor of entomology, applies Foster's expertise in computer and mathematical models for gypsy moth populations to Saunders' work in computer systems for aerial pesticide spraying.

Another cooperative project by Karl Mierzejewski, research associate in entomology, centers on improving the efficiency of pesticide sprays. Data from his aerial tests also are used by Ralph Mumma, distinguished professor of environmental quality, to study the occurrence and persistence of pesticide residues.

Schultz says the group divides its work into three categories: biological controls for gypsy moths, aerial application technology, and information management (telling landowners and others when to spray).

The group's work has also been used for applications other than gypsy moth control. For instance, the aerial spray group has used its work on penetrating the forest treetops with pesticide to spraying broccoli. "Broccoli has a canopy too, but it's only a foot off the ground," Schultz explains.

Schultz emphasizes that the research group's work still can only add one piece at a time to a biological jigsaw puzzle that is largely unfinished. Such things as controlling an outbreak or even predicting a gypsy moth infestation are merely pipe dreams for the moment. "If I could predict a gypsy moth outbreak, I'd be a rich man," Schultz says.

"Everybody has their pet theories about gypsy moths," he adds. "The difference at Penn State is that the person with the opposing theory is just down the hall instead of at another university."