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Botanical research thrives at University

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BOTANICAL RESEARCH
THRIVES AT UNIVERSITY

BY REBECCA YATES
UM INFORMATION SERVICES

MISSOULA, Mont.---

A young man, sportily attired under his white smock, bends over a microscope; an attractive woman roams the hills near Missoula; a tall man lights out early in the morning on a duck hunt.

Each of these activities is part of a search for answers to a basic question--What is life all about?

The three persons involved--Joe Clifford Elliott,26, Eau Claire, Wics.; Rita Audrey Pauloski, 31, Cleveland, Ohio, and Melvin LeRoy Thornton, 41, Missoula, are graduate students working towards their doctoral degrees in the University of Montana botany department.

Each is involved in unique botanical research to determine the place and function of forms of plant life in this environment. Each student's research is specific, revolving around one species of plant. When their papers are published they will bear long titles, latin names and language often incomprehensible to the layman.

But none of these research projects is divorced from what concerns man and, hopefully, each study will shed a little more light on just where man fits in the whole ecology.

"Since botany is the area of science which deals with all aspects of plants, botanical research not only can be basic and exciting in itself," said Dr. Sherman J. Preece Jr., UM botany department chairman. "Such research also forms the background upon which applied fields such as agronomy, horticulture, forestry, plant pathology and other aspects of agriculture depend.

"Botanical research," he continued, "also is becoming more and more important as an aid in the detection of air and water pollution and other aspects of environmental quality."

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Melvin Thornton's research one day may be helpful in water purification and lead to methods of biological control of certain species of plants and animals.

Thornton's special field is mycology, the study of mushrooms and other fungi, and his specific doctoral project involves the study of a microscopic acquatic plant. His main question is: How do these fungi get from one isolated body of water to another?

Fungi, Thornton explained, usually distribute their propagules or spores in two ways--indiscriminately by the wind, or internally and less haphazardly by animals.

For example, he continued, the puff ball mushrooms found in the hills around Missoula mature and break open, releasing "quintrillions" of tiny spores for the wind to carry. By contrast, he said, mushrooms, such as many of those found in meadows, deposit their spores on the ground for animals such as cattle to eat. The spores then go through the animal's intestinal tract and grow on the animal's manure. A special process then shoots the spores back onto the pasture to continue the cycle.

Through experimentation Thornton decided his fungi, which flourish on pollen, are not distributed by wind or by water. He then turned to acquatic and shore birds to see if these animals might be the vehicles of spore distribution.

Thornton explained that he goes out and collects the fungi and cultivates them. "I then feed them to the birds under as aseptic conditions as possible," he said.

After feeding the birds, Thornton washes their feet and beaks. "After several hours, we collect their droppings. This involves my whole family," he said.

Thornton also has combined duck shooting with his research. After killing the ducks, he has examined their intestines and discovered that the spores can be found there.

"From limited observation," said Thornton, "it looks as though birds are one of the ways these spores are distributed."

These fungi, Thornton indicated, are very abundant and very important. They are parasites of a number of organisms, including an algae which has been troublesome in water purification processes. They are also parasites on certain mosquito larva.

He said with further study man may be able to find a way to manipulate the fungi's propagation so that they can be used in controlling nuisance plant and animal populations.

Also, these fungi attack dead materials and decompose them much as bacteria do. "It may be," Thornton concluded, "that there are some ecological niches where my fungi are most important factors."

Finding the "ecological niche" of mountain hemlock, an interesting tree found in small quantities around Missoula, is the "classical" botanical research of Rita Pauloski.

The mountain hemlock, Miss Pauloski said, "sticks out like a sore thumb in our Montana forests." The tree is found in Asia and along our western coastline, reaching it's eastern-most range around Missoula where a small population can be found up near the timberline in the Snow Bowl skiing area, she indicated.

"I'm studying it, because it is kind of strange," she explained. "It is very different from the eastern hemlock and shows characteristics that are quite sprucelike. It's oriental looking; it grows rather tall; the needles tend to be kind of tufted and the leaves drop quickly like those in the spruce."

Miss Pauloski said some French women about 30 years ago, studied transplanted mountain hemlock and speculated that it is a hybrid.

"However," she added, "intergeneric hybrids are very rare and foresters have ridiculed the idea since they can find no throwbacks to one or the other species among the mountain hemlock population."

The young scientist, however, does believe it is a hybrid and speculates that the hybridization took place "way back when" when conifers were just beginning to evolve.

"Mountain hemlock" Miss Pauloski contended, "does not belong in the hemlock classification. It may belong to a genus all by itself."

Studies of conifers have been very limited, Miss Pauloski said. Her main purpose in the research is a classical one--to learn more about the plant, to know more about the potential of the species.

By studying and sampling populations in Western Montana, she hopes to produce a more definitive classification of the tree, thus easing the work of foresters and ecologists.

Trying to find out some of the mechanisms at work in cell division is the object of Joe Elliott's research.

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"I'm doing a very basic type of research," Elliott said. "I'm trying to figure out why one or two cells grow into a highly differentiated organism."

Elliott said the moss-like plant that he is using is ideal for his experiments because it's "just a little blob that hasn't any shape yet." Elliott's function is to induce different shapes to the plant.

He does this by setting up experiments with controlling factors, such as antibiotic or hormonal factors, known to affect cell differentiation. He also applies a group of compounds to the plant that is known to prevent cell division, thus causing the cell to continue to grow without dividing. This produces a kind of alkaloid poisoning, Elliott said.

"By observing the action within the plant," he said, "you can speculate on just how these cellular processes interact to govern the eventual shape of an organism.

"In theory," he continued, "these applications are broader than just this particular organism. I'm trying to figure out some of the mechanisms that might affect any kind of cell, such as just what controls the growth of a cancerous cell."

Ultimately, the young man said, it might be discovered that there are "unravelling processes that might be common to many cells, and the processes may fall into one major scheme."

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