

## Investigating the world at our feet

by Clare Howard

Barely one hour into a morning hike, Malcolm Sargent, international authority on mosses and liverworts, fell to his knees in Singing Woods Nature Preserve near a family of ancient white oaks. He dropped his head to the ground and peered through his hand lens at a verdant mass on the early spring forest floor.

A LOOK UP CLOSE - Dr. Malcolm Sargent, a world-renowned authority on moss and lichens, takes a close look at a sample of moss at Singing Woods Nature Preserve near Peoria, Ill., while hiking with a group including Mike Miller, background, chief naturalist at Forest Park Nature Center, and Emiko Yang, left, and Helen Gasdorf, both of Peoria. CNS Photo by Matt Dayhoff. TINY ECOSYSTEM - A magnifying glass illuminates the fine detail of a patch of moss gathered during a recent hike in Singing Woods Nature Preserve just north of Peoria, Ill. CNS Photo by Matt Dayhoff. LIVERWORT - A new patch of liverwort is instantly recognizable by its unique texture. CNS Photo by Matt Dayhoff. "Could this be? Brood bodies? Yes!" said Sargent, 70, scraping a tiny sample of asexual reproductive rhizomes into a specimen bag.

Next, he pulled a Global Positioning System unit from his backpack to record exact location.

Sargent, of Urbana, Ill., is one of the world's leading bryologists, a scholar of nonvascular plants. Often overlooked, often held in low regard, often trampled on unseen because they rarely exceed a few centimeters tall, mosses and liverworts hold scientific intrigue. These plants have evolved to produce chemical compounds to protect themselves. They have learned to grow and reproduce in favorable conditions and become dormant in adverse conditions.

"They are experts at chemical warfare," Sargent said. "Maybe they produce antibiotics. Several labs are seriously researching this. Mosses and liverworts are the canary in the mine, telling us what's going on in the environment.

"Mosses and liverworts are important for their intrinsic value. They live here on Earth. But they also produce unique materials. Who would have thought moldy bread would save the lives of so many people?"

A University of Illinois emeritus professor, Sargent was in Peoria, Ill., for a mosses and liverwort field trip organized by Mike Miller, chief naturalist at Forest Park Nature Center in Peoria Heights.

"It's not like mosses are large plants, easy to identify. It's a little bit of a guessing game because everything is so tiny, almost microscopic," Miller said. "You can walk by them for years and not understand them. But get them under a microscope and start understanding the diversity of life. It's a Lilliputian world. Mosses and liverworts open avenues of realization."

Miller said liverworts are a little different in structure but with the same basic life cycle of mosses. Both have no vascular tissue.

Over the past year, Sargent has traveled to New York twice, Florida twice, Arizona, Vancouver and Maine researching mosses and liverworts. His collection will end up at the Field Museum in Chicago, which has a collection numbering in the millions, he said.

"All of my collections will go to the Field," Sargent said. "I've been collecting over 30 years ... 2,000 identified, 10,000 still to identify, each with a notation where it was found and the date."

## THE MOSS MAGNUM OPUS

In December, Sargent released his magnum opus, an innovative identification guide for mosses that can be found and downloaded at [www.life.uiuc.edu/moss-guide](http://www.life.uiuc.edu/moss-guide). Since it was posted in December, the guide has received more than 500 hits from 30 countries.

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"This approach is very different from what anyone has done before to identify mosses," Sargent said. "It starts with the obvious, naked-eye characteristics, then characteristics observed with a hand lens as we do in the field. The third characteristic is seen in the dissecting microscope. Work on this guide has been five years in collaboration with Diane Lucas."

Sargent veered from his academic focus on molecular biology to mosses and liverworts. At Singing Woods, he and his group of hikers trudged along a stream fed by seeps trickling from the bluffs. The forest floor was gooey with mud, hungrily sucking up hiking boots.

"Mosses are the sponges of the plant world," Sargent said, nimbly navigating from rock to rock.

He said there are 1,400 species of mosses in North America and 500 species of liverworts.

"Lichens have even more diversity. There are 10,000 lichens," Sargent said.

## RAISING PUBLIC AWARENESS

Hiking with Sargent was bryologist Rick Smith. He plans to propose a moss and liverwort section for Luthy Botanical Garden in Peoria to help raise public awareness of mosses in the garden. Smith said he heard recently that a developer in New York City wanted advice on creating a wall of mosses in one of his projects.

Interest in and recognition of these most primitive plants could be growing, he hopes.

Sargent started teaching at the University of Illinois in 1968 and retired in 1999. Referring to his guide, he said, "This represents my teaching, and it is still my scholarship ... to develop a guide to make it easier to identify mosses and liverworts."

As the hike at Singing Woods continued, Sargent collected 30 samples.

"What's this? Pleurocarp prostrate! I seriously doubt if we've picked this up," he said toward the end of the field trip.

Back at Forest Park Nature Center, Sargent spread his samples out on tables and set up several microscopes. The specimens were discussed and identified over the next few hours.

"I certainly hope over my career I've triggered a few students to veer into mosses and liverworts," Sargent said. "Mosses and liverworts will give us a better idea of what is happening in the environment and how successful we have been with our attempts to repair some of the destruction we've done."

Several weeks later, standing on the brick paver paths outside Forest Park Nature Center, Miller found himself scanning the cracks, searching for little colonies of bryan, a common genus of moss that often grows on sidewalks.

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