Researchers to sequence genome of flowering plants' ancient living relative

October 14 2010, by Bill Kanapaux

University of Florida researchers are part of a nationwide team preparing to open a door into better understanding plant evolution by sequencing the genome of the single living sister species to all other flowering plants.

The information on *Amborella trichopoda*, a large shrub found only on the South Pacific island of New Caledonia, will help researchers understand how flowering plants diversified over time and provide insight into the key processes that have driven the formation of the world's ecosystems.

A consortium of five universities will share the complex task of unlocking the plant's genetic secrets as part of the $7.3 million project funded by the National Science Foundation. The work at UF is a collaborative effort among researchers at the Florida Museum of Natural History, the department of biology and the UF Genetics Institute.

"This plant shares a common ancestor with the first flowering plants, which places it in a unique evolutionary position," said Pam Soltis, project co-investigator and distinguished professor and curator of molecular systematics and evolutionary genetics at UF's Florida Museum. "The information from the project will allow researchers to determine whether a specific gene or process is unique to a particular plant or goes back to the beginnings of angiosperm evolution. This will enhance efforts to improve agriculture and forestry by giving plant biologists a reference point for understanding all other flowering plant

genomes."

The Pennsylvania State University is the lead institution on the four-year project, which also involves the University of Arizona, the University at Buffalo and the University of Georgia.

Over the relatively short time span of 130 million years, angiosperms, or flowering plants, have diversified into more than 300,000 species, covering nearly all terrestrial habitats and many aquatic ones.

"This genome will tell us about the evolution of angiosperm genomes through time," said Doug Soltis, UF distinguished professor of biology and project co-investigator.

Brad Barbazuk, also of the department of biology, is the third member of the UF team, which will receive about $1.5 million for its work on the project.

UF researchers will assemble smaller sequences of DNA generated at other institutions into the complete *Amborella* genome, and also map specific genes on the plant's chromosomes through a process that uses microscopic fluorescent labels.

"If tracing your ancestors is your hobby, you will love the *Amborella* project," said Stanford University biology professor Virginia Walbot. "All future studies of flowering plants will use this catalog of *Amborella* genes to interpret the changes that have ensued during the natural selection that resulted in the hundreds of thousands of flowering plant species present on our earth today."

Pam Soltis said about 10 flowering plant genomes have been completely sequenced and none comes close to *Amborella* in terms of its place near the base of the evolutionary tree. Plants are more difficult to sequence

than animals because their genomes are generally larger and more complex in terms of repeated sequences.

"*Amborella* is the platypus of the angiosperms," Doug Soltis said.

The platypus genome has been sequenced for mammals because it occupies the first branch of the mammal evolutionary lineage and is a reference genome for all other mammals. And like *Amborella*, there is no other genus in its family.

"But the platypus is a sister species to only about 4,500 mammals," Doug Soltis said. "*Amborella*, on the other hand, is a sister species to more than 300,000 flowering plant species, so you can see how much more significant a role it could play in helping scientists better understand how the world's terrestrial ecosystems, dominated by flowering plants, developed over time."

A majority of genome research funding goes to the biomedical industry, and much of the technology used in plant genomics comes from that.

"A lot of what we're doing has trickled down from the human genome project," Pam Soltis said.

Provided by University of Florida