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The scoop on poop: Insect feces, dead leaves may provide clues to health of world

Scientific exploration to measure scat in the rainforest

Barro Colorado Island, Panama--Insect feces and leaf litter in the rainforest may provide important clues to better understanding global climate change, according to a group of scientists conducting research in the Panamanian rainforest on a JASON Project expedition.

Clues to determining how these factors contribute to global climate change lie in scientists investigating how plant and animal activity in the rainforest treetops, known as the canopy, may potentially influence soil processes – decomposition, respiration and nutrient availability – on the rainforest floor.

Working at the Smithsonian Tropical Research Institute's facilities on Panama's Barro Colorado Island, scientists are linking the two rainforest layers in one overall tropical examination.

"The rainforest canopy is the hotspot for animals and plants. It's the hub of activity that keeps the world going," said Meg Lowman, an expedition researcher and professor of environmental studies at the New College of Florida in Sarasota. "No one measured the canopy until 20 years ago, and now that there are long-term sampling data of both the canopy and floor, we need to look at the bigger picture: how the rainforest ecosystem is connected as a whole."

Expedition scientists are connecting the two rainforest layers by examining the effects that canopy materials – such as insect feces (frass), green leaves, dead insects and rainwater – have on the rainforest floor, when they fall from the canopy.

"We're predicting that an increase in falling canopy materials, will raise the amount of carbon, nitrogen and phosphorus in the forest floor soil," said Lowman. "That will in turn, boost the rate of leaf litter decomposition, which escalates plant growth rates. This is a vital part of sustaining a healthy tropical environment."

"Portions of the half-eaten leaves and insect droppings eventually fall to the rainforest floor," Lowman said. "That is where a lot of the magic happens."

"On the forest floor, microbes decompose the dead leaves and insect frass and release their nutrients back into the soil and trees," said expedition scientist Mike Kaspari, an associate professor of zoology at the University of Oklahoma. "This cycle of nutrients occurs very rapidly in the rainforest. A leaf can completely decompose and its nutrients return to the soil in a matter of a couple of months. But, in Vermont for example, if a leaf falls in September, it will still be on the ground in April."

"Global climate change is driven by gases like carbon dioxide, when too much is emitted into the atmosphere from things like car exhaust and aerosol," said Kaspari. "Rainforests act as carbon dioxide scrubbers, taking it out of the air. Rainforest plants can't thrive, if the nutrients aren't being released back into the soil from decomposition."

"To keep global climate stable, the rainforests have to be healthy," said Lowman.

This research program is part of the JASON Project, a middle school program designed to engage students in science and math. Using technology tools to link real scientists in the field with classrooms, students receive a first-hand look at the exciting work scientists are doing.

"It engages students in real science, not just textbook theory," said explorer Robert Ballard, founder of the JASON Foundation for Education and best known for his discovery of the Titanic.

Participating schools around the world play an active role in the research through experiments they will be conducting in their local communities. Students compare the rate of decomposition in their areas to that of the expedition site by placing bananas outside their classroom. Over the two-week period, students compare the amount of decay of their banana to one at the expedition site. They also interact with the JASON expedition

team in real time through live interactive satellite broadcasts, Webcasts and chats on the Internet.

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The research being conducted by Lowman during the expedition will contribute to a study funded by the National Science Foundation with support from her colleagues from the University of Georgia and Oregon State University.

To follow the JASON expedition's exciting research, visit www.jason.org for daily updates from expedition students, teachers and scientists.

Using multi-media tools and access to the nation's leading scientists, JASON combines genuine scientific expeditions around the world, standards-based classroom curriculum and accredited professional learning for teachers to deliver real adventures in learning and measurable gains in student achievement.