## Abstractions

**FIRST AUTHOR**
The forests in the Guiana Shield and the Amazon basin of northern South America are probably Earth's largest stores of biodiversity. To explain large-scale biogeographic patterns and processes, Hans ter Steege of the Institute of Environmental Biology in Utrecht, the Netherlands, and his collaborators looked at seven forest inventories of biodiversity compiled by countries in the region. They analysed the adaptation of the most common tree genera to soil fertility and dry-season length (see page 444). Here, ter Steege tells *Nature* about analysing the regions' rich biodiversity.

**Why were the inventories first made?**
To evaluate national resources such as timber. The Brazilian inventory is the biggest. It is used, for example, for agricultural purposes to estimate the quality of a soil and its mineral content for mining.

**Why is it important to link gradients in factors such as soil fertility to tree distribution?**
Linking two gradients helps us find the factors and mechanisms that influence diversity and species distribution. This is the first time such an analysis has been done on a large scale.

**Do the participating countries have an interest in biodiversity?**
Yes. Most have established a system of natural protected areas, especially Brazil and Venezuela. In Brazil there is also much interest in evaluating forest resources such as rubber. In other countries, such as Venezuela and Suriname, the main focus is conservation.

**Was it difficult to collaborate with so many different nationalities?**
No. We have been working with the Amazon Tree Diversity Network for a number of years. This consists of 50–60 people. The rules are clear — anyone contributing data becomes a co-author on resultant publications.

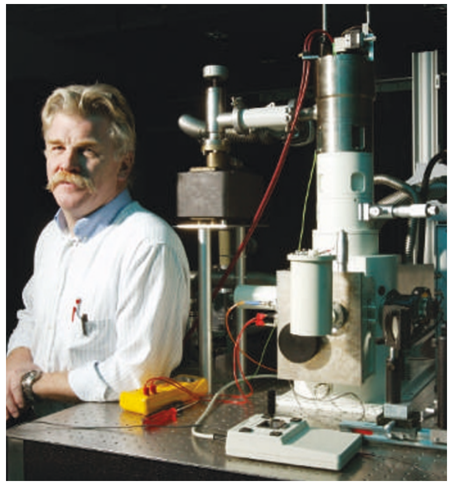
**In future, do you plan to go into finer detail?**
Yes, but the large-scale inventories are only detailed enough to look at the genus level. We are using one-hectare plots to look at the species level. We want to gather information about tree diversity that can help us understand primate nutrition. If we can calculate the number of trees that fix nitrogen, we can estimate the number carrying fleshy fruits that primates eat. We can then compare this with primate diversity and density.

**Are we facing a biodiversity crisis?**
I believe we are. I think the fragmentation of the Amazon is a problem and a pity. But the survival of the people living there must also be considered. ■

## MAKING THE PAPER

### Benoit Deveaud-Pledran

**Physicists show possibility of creating superatoms from solids.**



A Bose–Einstein condensate is matter in a phase distinct from solids, liquids and gases — it can be brought about from some gases at very low temperatures. When sufficiently chilled, most atoms in such gases drop to the same quantum level and essentially act as one overlapping atom — a 'superatom'. Although scientists achieved such condensation in rubidium gas more than a decade ago, efforts to slow particles in solids in a similar manner have been unsuccessful. This is because the temperatures solids can reach are constrained by limits to their disorder.

Now, collaborators from five institutions have come tantalizingly close to achieving Bose–Einstein condensation in solids. A group of physicists, led by Le Si Dang at the University of Joseph Fourier in Grenoble, France, used different particles from those conventionally used in such attempts. They made a subatomic trade-off. Excitons — neutral atoms in an excited state — theoretically require prohibitively low temperatures to condense, but are relatively stable. Short-lived particles known as exciton polaritons, which result from the coupling of light with excitons, do not require such low temperatures. But the condensate they achieve has a lifespan of picoseconds.

The group's results (see page 409) do not show a strict Bose–Einstein condensate. However, they provide evidence that such a state can be achieved in solids — albeit by different rules from those that apply to gases. When the researchers increased the polariton density, they saw signs of a transition toward a condensate. This condensate was coherent through space, albeit for a short time.

Benoit Deveaud-Pledran, a physicist at the Ecole Polytechnique Fédérale in Lausanne, Switzerland, expects this work to be challenged. Previous claims by researchers that they had achieved solid-state Bose–Einstein condensation underwent vigorous attack. He predicts critics will contend that the particles he and his colleagues used have too short a lifespan to reach a stable condensate. "A number of people told us this was not possible," he says.

To bolster their claims, the group plans to make its data available to theorists outside the collaboration. These detail the fraction of polaritons that condensed at various temperatures. But the team has already suffered a setback — the machine used to produce its samples no longer works. The researchers hope the publication of this paper will attract funds for another machine. Until then, they hope that the evidence put forward in the paper will be enough to convince the sceptics.

Deveaud-Pledran is certain that Bose–Einstein condensation will continue to captivate researchers. He says that the past decade of dedicated basic-research funding has been vital to his work, which has also benefited greatly from recent theoretical advances. "Our long-term collaboration focused on the experimental side, but when things started getting hot, we contacted our theoretical colleagues to ask for their interpretation," says Deveaud-Pledran. ■

## KEY CONTRIBUTOR

After finishing high school, Alina Vrabioiu travelled from Bucharest in Romania to the United States. There, she studied at the Massachusetts Institute of Technology, and quickly found success.

Just months after receiving a PhD in biology from Harvard, Vrabioiu, now a research fellow at Harvard Medical School, co-authored a *Nature* paper with her advisor, Tim Mitchison. He is well known for his work on cellular cytoskeletal dynamics.

Her project went surprisingly well, she says, allowing for a rare two-author paper in a field that often requires large teams of researchers. "The project was risky, but we were lucky," Vrabioiu says. "It's rare to just think of a project and then find it works."

Vrabioiu's paper describes the organization of filamentous septin proteins at the start of cytokinesis, the final stage of cell division in most eukaryotes (see page 466). The topic has long been controversial. By rigidly attaching a green-fluorescent-protein marker to yeast septins, then probing them with polarized light, Vrabioiu and Mitchison were able to look at the septin filaments in fine detail.

They found that the filaments form ordered structures and undergo a 90° rotation just before the onset of cytokinesis. Their results indicate that these proteins have a mechanical role in cell division. ■