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UBC discovery unlocks tree genetics, gives new hope for pine beetle defense

UBC researchers have discovered some of the genetic secrets that enable pine and spruce trees to fight off pests and disease, uncovering critical new information about forests' natural defense systems.

Assoc. Prof. Joerg Bohlmann says this genetic analysis will allow forest stewardship programs to reinforce a forest's inherent strength, breeding trees that could in time repel insects such as British Columbia's notorious mountain pine beetles.

Bohlmann and his research associate Christopher Keeling explored the genetic makeup of oleoresin within spruce, discovering a sophisticated ability to produce complex blends of chemicals that continuously evolve to protect the tree from changing conditions and challenges.

"Conifers are some of the oldest and longest living plants on the planet," says Bohlmann. "We've opened the book to understanding how they can survive in one location for thousands of years despite attacks from generations of insects and diseases."

Their study examines the molecular biochemistry of conifers interacting with genomes of bark beetles and bark beetle-associated fungal pathogens. Bohlmann's study appears in today's edition of the *Proceedings of the National Academy of Sciences.*

"Figuring out how these naturally occurring defenses work has important implications for the long-term sustainability and health of our forests," says Bohlmann, who's working with the B.C. Ministry of Forests and Range, the forestry industry and the Canadian Forest Service.

Bohlmann is also co-leader of the recently announced $4-million project that Genome BC and Genome Alberta is funding to investigate the mountain pine beetle infestation at the genomic level.

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Insect pests and pathogens cause annual losses of billions of dollars to conifer-based forest economies in North America and Europe. In B.C., the mountain pine beetle epidemic has killed about 40 per cent of the pine forests since its first appearance in the mid 1990s.

This is the largest recorded bark beetle outbreak in Canada, leaving B.C. with 13 million hectares of grey and red dead pine – an area four times the size of Vancouver Island and a volume of dead timber equivalent to 530 million telephone poles.

Bohlmann is leading UBC's and international research programs on forest health genomics. In 2006, Bohlmann and a team of international scientists completed the world's first physical map and sequencing of a tree genome – the third plant ever sequenced.

He is based at UBC's Michael Smith Laboratories, a multidisciplinary research facility. Bohlmann also holds teaching appointments in the departments of Botany and Forest Sciences and is an associate at UBC's Wine Research Centre.

Bohlmann and study co-authors are members of the Treenomix project, Canada's first large-scale forestry genome project. Their work received support from the Natural Sciences and Engineering Research Council of Canada (NSERC), Genome BC and Genome Canada.

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