

“Bioprospecting: When Money Grows on Trees”

*Tigra scientifica* column

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Malaria has ravaged mankind throughout recorded history. Until the early 1600s, the old world had no cure for this pestiferous disease. Relief was delivered by a Jesuit missionary in the form of teas made from the bark of Peruvian Cinchona trees. Quinine, one of the most effective malaria medications ever created, was obtained from this bark. The missionary learned of the bark from indigenous people he encountered during his travels in Peru.

The act of finding medicinal solutions in nature, often due to transmission of native knowledge to foreigners, is now known as 'bioprospecting.' Although the term is a new one, coined by Dr. Thomas Eisner in 1989, the actions it describes are as old as humanity. The U.S. National Park Service defines it as "scientific research that looks for a useful application, process or product in nature." Once there were trial-and-error attempts based on ingestion and luck, now there are empirical investigations of chemical structure and controlled drug trials.

And bioprospecting doesn't just benefit man medically, although more than half of cancer drugs approved by the FDA are of natural origin; many powerful scientific tools, such as Taq polymerase, and green fluorescent protein, and solutions to engineering problems can be found in nature. For example, recently bumblebees helped Nissan design a car which avoids crashes.

As knowledge of nature increases, the state of the human condition improves.

The vast potential wealth inherent in the discovery of previously unknown and powerful biological processes has led to a recent upsurge in bioprospecting. A motley crew, ranging from large pharmaceutical corporations to rogue ethnobotanists, has joined in this modern day "gold rush." Often they aren't looking in their own backyard (although some are and claim that soon an entirely new class of antibiotics will come from soil fungi). They're looking in other countries, cultures and ecosystems, and often exploiting those areas without compensation.

The response to this 'biopiracy' has been international, and regional commissions seek to regulate the activities and rewards of bioprospecting. In 1993 the international voluntary Convention on Biological Diversity established sovereign national rights over biological resources in participating countries; sidenote: the United States is not a member of the convention. In 1998 the U.S. implemented the National Parks Omnibus Management Act which facilitates contract creation between bioprospectors and the parks. As most countries are devising ways to protect natural treasure chests, they are realizing that environmental degradation can rob the coffers of wealth.

How can revenue rights be negotiated on an extinct species? How can an organism be mined for information if it's extinguished before discovery? "Useful products cannot be harvested from extinct species," said Harvard biologist E.O. Wilson. Knowledge about natural and chemical engineering marvels is best characterized by how very little is known. There is more confidence in knowledge about the number of stars in the sky than there is about the number of species on Earth. The best current estimate puts the total number of species at around 10 million, but less than two million are known. Each year 50,000 species go extinct, and the rate is increasing. Humanity has greatly benefited from the knowledge of only one-fifth of the

world's species. What would be possible if all species were known?

Bioprospecting is not just mining nature for novel applications; it is ensuring the protection and prosperity of the natural world.