

Bioprospecting: securing a piece of the pie

The commercial use of biodiversity has become a highly contentious area of policy, marked by mistrust and misunderstanding. Sarah Laird and Rachel Wynberg say the arguments are far from being settled.

Bioprospecting—the exploration of biological material for commercially-valuable genetic and biochemical properties—is usually associated with the contemporary research and development of biodiversity using sophisticated technologies in research intensive industries. However, the practice of collecting, analysing, and commercializing biological material is as old as human civilization. New crop varieties, medicines, livestock, and other products have resulted from a long history of trade and exchange of genetic and biological resources, and associated traditional knowledge.

Today, the pharmaceutical, biotechnology, seed, crop protection, horticulture,

cosmetic and personal care, fragrance, botanicals, and food and beverage industries market numerous valuable products derived from genetic and biological resources. They also undertake research and development for new products, or use genetic resources in their research or manufacturing. But the ways companies demand access to resources, and use them as part of R&D programmes, or in commercial products, varies significantly by sector.

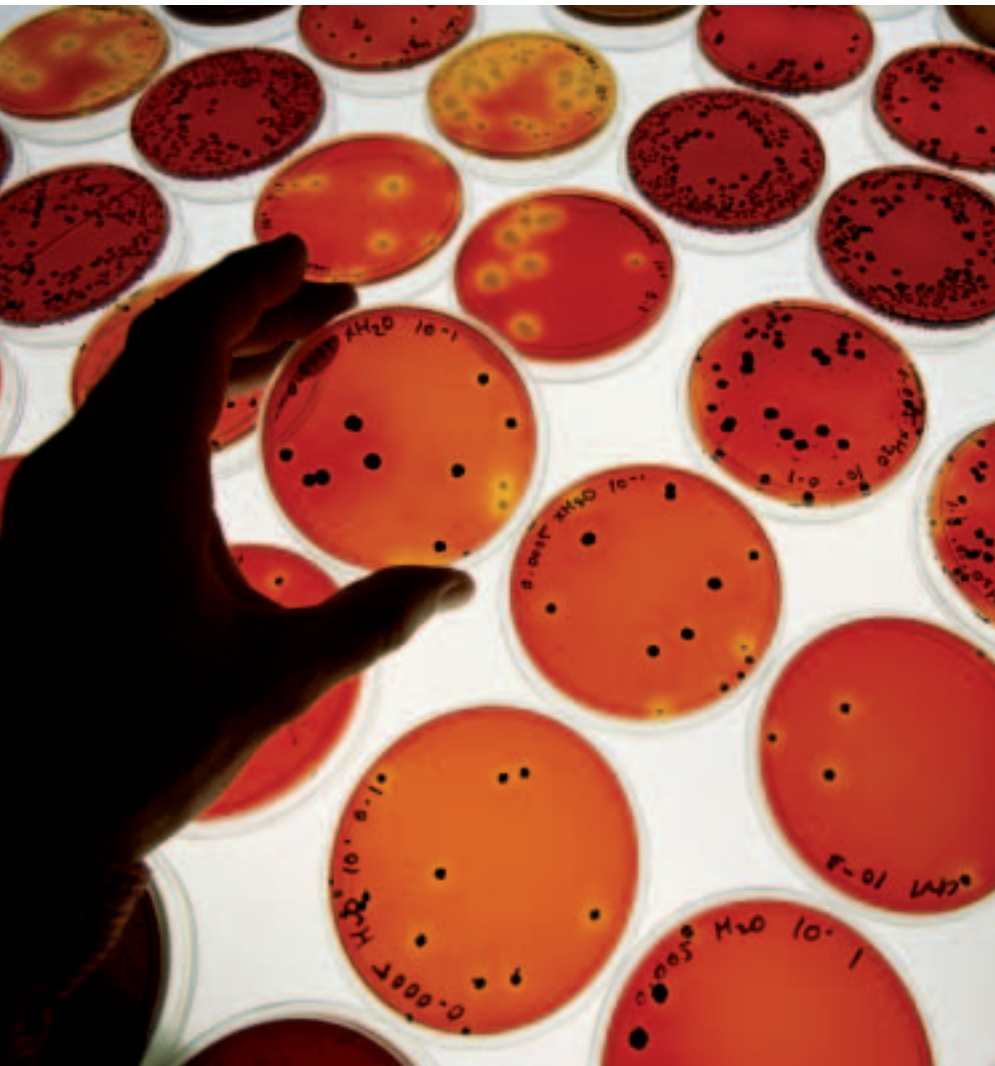
Scientific and technological advances in the 1990s led many pharmaceutical companies to lose interest in natural products as a source of molecular diversity for drug discovery and development. Natural products were

considered too slow, too costly, and too problematic from a scientific and business perspective. There were also major uncertainties because of the lack of legal clarity associated with gaining access to material under the terms of the Convention on Biological Diversity (CBD) which require equitable benefit sharing, prior informed consent, and mutually agreed terms. At the same time, however, natural product drugs developed in earlier years continued to contribute significantly to industry's bottom line, particularly in categories like infectious disease and cancer.

In the last decade, in what are now well-established research cycles, new scientific and technological developments have once again made natural products of interest. At the same time, however, they have also made it possible to look with new eyes at what is found in companies' 'backyards' and to generate more diversity in the laboratory, where existing genome sequences and databases can yield novel structures. The full impact of these developments on demand for access to genetic resources from high biodiversity areas is still unfolding, but it is likely that nature will continue to be a source for original novelty and complexity that will then be modified in the laboratory.

As a result of these advances, microorganisms are of increasing interest to the pharmaceutical and biotech industries. While plants, insects, marine and other organisms continue to be studied, new technologies allow researchers to access microbial diversity previously inaccessible to them. At the same time they are discovering a far greater number of interesting compounds in known organisms through 'genome mining'. The astounding numbers and diversity of microorganisms, combined with their all-pervasive existence, have led to renewed interest in their use for energy- and water-saving industrial processes, climate control, pollution control, biomaterials, and many other applications. When collecting from nature, biotech companies are interested in biochemical diversity found not only in areas with high species diversity, but also in extreme environments or unique ecological niches like salt lakes, deserts, caves, hydrothermal vents, and cold seeps in the deep seabed.

The US Venter Institute is undertaking a global expedition to sample microbial



abundance and diversity in marine and coastal environments. The findings will be used to design and engineer species to replace petrochemicals, better understand reef health, analyse drinking water and air quality, track and avoid emerging viruses, and understand the effects of releasing ships' ballast water. Initiatives such as these throw up a host of new questions and challenges regarding access and benefit sharing (ABS), including difficulties in assigning ownership over microorganisms, and prior informed consent and benefit sharing associated with these collections.

In recent years, concerns about biopiracy have escalated. In some cases these concerns have been necessary stimulants towards attaining equitable agreements and persuading reluctant parties to negotiate. For example, public outrage was expressed about the filing by the South Africa-based Council for Scientific and Industrial Research (CSIR) of a patent for active compounds of the Hoodia plant responsible for suppressing appetite. The indigenous San had long used the plant for this purpose, but the CSIR did not get consent to use this traditional knowledge, and the San were not acknowledged in

the patent application. International media coverage and NGO pressure forced the development of an agreement of mutual benefit to the CSIR and the San.

On the other hand, charges of biopiracy and legal uncertainty associated with accessing genetic resources are considered major impediments to commercial and academic research. A number of companies have restricted their research activities as a result, and many academic researchers find the ABS policy process is having a negative effect on basic science and traditions of trust and collaboration. Rather than coming together to create simple, workable legal and regulatory ABS frameworks, providers and users of genetic resources are increasingly estranged. The bioprospecting environment is characterized by misunderstanding, mistrust and regulatory confusion.

Under the auspices of the CBD's Ad Hoc Open Ended Working Group on Access and Benefit Sharing, negotiations are taking place to develop an international regime on ABS in relation to biological resources and traditional knowledge. Such negotiations have been ongoing for four years, and are due to conclude in 2010. The process is

intensely political and conflict-ridden, with little agreement on either the scope or objectives of the new regime. Bridging polarized views might be possible however, with improved understanding of the financial, legal, scientific and technological realities of bioprospecting and the benefits it can yield. Also needed is the development of informal processes to promote dialogue and build consensus between stakeholders. These are areas in which NGOs can make an important contribution. ■

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