

entwined carbon rings. But even simple polymers have their uses, and combinatorial chemistry gives the developers complete knowledge and control over what they are working with.

Some supporters of combinatorial chemistry question the value of biodiversity as a source of new drugs. "I think it leaves [biodiversity] completely high and dry," says David Galas, formerly head of the Department of Energy's human genome sequencing efforts, and now president of Darwin Molecular, a biotechnology company based in Seattle.

"As we learn more about three-dimensional structures, it appears there is nothing special about natural products," he asserts. For Galas, the study of biodiversity is useful primarily because it provides insight into what evolution has produced. "The idea of

exploiting the rain forests to find wonderful drugs is, quite frankly, not credible," he says.

Galas further claims that romantic sentiment is blinding plant scientists to this reality. "Plant scientists have come to have such reverence for plants that you'll find a lot of reverence for natural products — but I think it is misplaced."

Most other observers, however, expect that a combination of natural and synthesised products will lead to future drugs. "Both paths have a very rich future," says Robert Horsch, manager of Monsanto's Agracetus Campus at Madison, Wisconsin. The ability to synthesize proteins is growing exponentially, he says, "but we can't even dream of making all possible combinations. Nature has been trying this experiment for two billion years".

Eric Fischer, head of the science, technology and medicine division of the Congressional Research Service in Washington, DC, and former director of the biology board at the United States' National Research Council, concurs. Fischer says our current understanding of structural biology is far too shallow to allow for the synthesis of the kinds of molecules that nature can produce. "Natural prospecting can get you whole new classes of materials that you couldn't even have imagined," he says.

The biological approach

At present, however, that fact isn't sufficient to push major drug companies to invest seriously in bioprospecting. To give that impetus, scientists advocate a more selective approach, based on a better understanding

Social equity versus private property: striking the right balance

[LONDON] Nowhere do the rhetoric and the reality facing bioprospecting come into sharper conflict than in attempts by developing countries to bridge their international commitments to two separate agreements. These agreements are the UN Convention on Biological Diversity, signed at the 1992 Earth Summit in Rio de Janeiro, and the Trade Related Aspects of Intellectual Property Rights (TRIPs) agreement of the World Trade Organization (WTO), which came into effect in 1995.

As far as the Biodiversity Convention is concerned, bioprospecting will move to centre stage next month, when representatives of more than 170 countries gather in Bratislava, Slovakia for the fourth 'conference of the parties'.

A key issue there will be how to reach a compromise, between the commitments to accessibility and equity enshrined in the convention and the pressures for private ownership and profit-based systems of reward represented by TRIPs.

Four of 42 articles relate to bioprospecting. They broadly require governments to outlaw bioprospecting without a host country's consent and for the results of research, and benefits arising from commercial use of genetic resources, to be shared "in a fair and equitable way", on mutually agreed terms. Beneficiaries are to include traditional communities, and innovations to traditional medicinal compounds need their "approval and involvement".

Signatory states are supposed to incorporate these articles in national law. About 80 developing countries are addressing the task. But so far progress has been slow. Calestous Juma, the convention's executive secretary, says this is mainly because countries lack the capacity to enforce regulations. He says that laws require



Seeds of confusion: the WTO and the biodiversity convention appear to be at odds over patent rights.

"reciprocal arrangements in countries importing biological resources for them to be fully effective".

But another reason for the delay is TRIPs. Not only does this agreement appear to conflict with the spirit of the convention, but it also has teeth: if WTO members do not sign up to TRIPs, they face trade sanctions.

TRIPs contains a detailed framework for intellectual property rights, which specifies that, although plants and animals as such do not necessarily have to be covered, microorganisms and "essentially biological processes for [their] production" must be.

There is no requirement on applicants to involve or consult with local communities or governments about patenting a compound based on a natural product from that country. Nor is there provision for sharing benefits or including the prior contributions of indigenous peoples to an innovation.

The Biodiversity Convention states clearly that legislation on intellectual property rights should "not run counter" to

the convention. Many developing countries believe TRIPs is in clear breach. But the WTO disagrees, arguing that there is no conflict between the two.

Admittedly, TRIPs acknowledges the right of countries to decide on the details of their own patent systems. But other WTO member states do not have to honour such systems, and can mount a challenge to them.

Unlike the biodiversity convention, TRIPs carries a timetable for compliance. Developed countries had to comply by 1996. The larger developing countries, such as India, China and those in Latin America, must harmonize their patents legislation by 2000. The least developed countries are given a further five years.

While countries such as Brazil and Argentina are rushing to get TRIPs onto their statutes, others — notably many in Africa — are therefore in no hurry.

In Africa, a declaration issued last month by the Organization of African Unity's (OAU's) task force on access to genetic resources argued that TRIPs should comply with the biodiversity convention, and not the other way round (see *Nature* 392, 423; 1998).

Johnson Ekpere, executive secretary of the OAU's Scientific and Technological Research Commission, describes the WTO's approach as "predatory". He claims it "runs counter" to the biodiversity convention, as well as the "aspirations of communities which are in the first place the innovators of biodiversity". The OAU is pushing member countries to adopt its own model legislation before the first review of TRIPs next year.

But David Downs, a senior attorney with the Centre for International Environmental Law in Washington, DC, says the review will focus on trying to reopen the exclusion of patents on patenting plants and animals — not bringing TRIPs into line with the biodiversity convention.

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