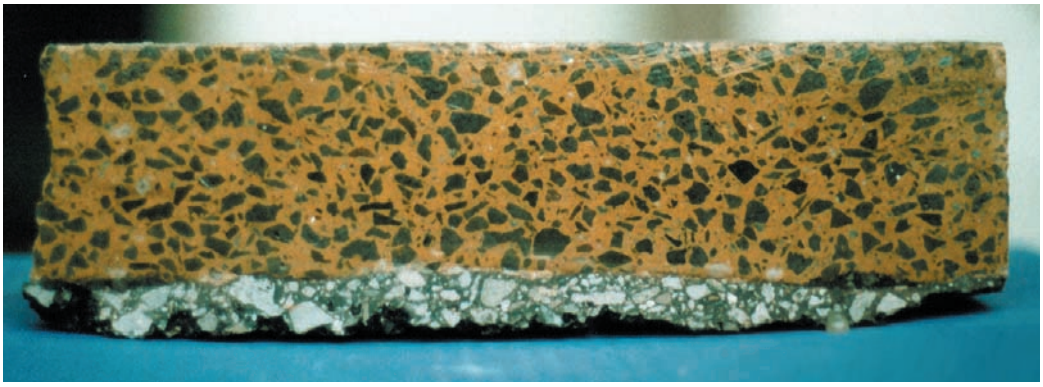

A cross-section through GE0320 asphalt laid on a road base, showing a lack of the 'voids' (air spaces) which normally weaken regular asphalt bitumen. EcoPave

Life could be cooler with sugar coated roads

Family-owned Australian company, EcoPave, has developed a commercially viable, non-petroleum-based asphalt substitute made from organic wastes, such as the sugar by-product molasses. Its GEO320 asphalt not only out-performs regular, 'old-fashioned' road asphalt bitumen, it is also less toxic and promises reduced environmental impacts. EcoPave say their product is internationally unique.

Under development and testing for 20 years, GEO320 has come of age – right on time it seems. About 2 billion tonnes of asphalt bitumen are used annually around the world and demand is growing dramatically – especially as Asia's development boom continues.

Bitumen, which is the main component of regular asphalt, is manufactured by an energy-intensive process from rare, heavy-grade crude oil. It is then developed into aggregated asphalt road surfacing using further petrochemical by-products and solvents. These emit lots of toxic fumes and residues at all stages of production.

GEO320, on the other hand, can be made from a range of organic waste products including those from sugar, palm oil and coconut processing, and potentially sewage effluent. EcoPave say they can also develop it from recycled motor oil.

At present molasses is primarily being used to produce GEO320. The result is an asphalt that is non-toxic, comes in a dry granulated form, requires no hot storage, has 50% higher durability, greater resistance to fatigue, wear, cracking, fading and solvents, low volatile emissions, and unlike current bitumen road surfaces, a safer non-slip surface.

In addition, its higher light reflection in coloured form means it absorbs 50% less heat, thereby helping to reduce the 'heat island' effect of higher temperatures in built up areas, contributed to by today's dark roads. Recycled plastics can be incorporated into the aggregate stage, and the EcoPave asphalt is fully recyclable.

'Road safety and the environment were the main reasons when designing GEO320,' said Mr Eerik Owerhall, owner-partner of Ecopave Australia. 'To date there has been no alternative to bitumen which is probably one of the last remaining products that has not seen major progress in terms of its source and characteristics.'

After benchmark testing by research and transport organisations since 1987, EcoPave has just won its first tender to provide to GEO320 for the EcoVillage development at Currumbin, Queensland.

'We're suddenly getting many international enquires, but can't service them all at present. We're seeking venture capital assistance,' Mr Owerhall said. 'India, for example, has requested a licence to produce GEO320, but we want to service the Australian market first.'

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Marine DNA work eases drug search pressure on wild stocks

A new methodology, developed by an international team of scientists from the Australian Institute of Marine Science (AIMS), the University of Aberdeen, and The London School of Pharmacy, has removed a huge hurdle to the development of new drugs from the sea. By cloning marine DNA into the common bacterium *E. coli*, the researchers hope to obtain a sustainable supply of exciting new drug leads from the sea, without compromising wild stocks of the marine species currently collected for new drug research.

The work is a world-first achievement designed to eliminate the supply obstacle that has stalled the development of many promising marine-derived pharmaceuticals.

To produce a cancer-fighting drug from a marine-source, for example, we might need to harvest 20 000 tonnes of a particular sponge per year…

Dr Walt Dunlap, a leading biochemist from the Australian Institute of Marine Science (AIMS), said compounds from marine organisms, like seasquirts and sponges, show exceptional promise for the treatment of cancer, inflammation and viral diseases.

The main problem has been obtaining a large-scale supply of these complex chemicals for worldwide use in an ecologically sustainable and economically viable way.

AIMS Marine Biotechnology Group Leader Dr Chris Battershill said it is one of the most important breakthroughs in marine biotechnology in recent times and heralds a new future for drugs from the sea.

'Without an assured source pharmaceutical companies are unwilling to invest the estimated $800 million it takes to get a drug from the sea to the shelves. To produce a cancer-fighting drug from a

Crucial steps forward recognised at the Eurekas

This year's Australian Museum Eureka Prizes showcased some outstanding national and international research contributions to sustainable development.

Professor Mark Burgman of the School of Botany at the University of Melbourne won the **Botanic Gardens Trust Eureka Prize for Biodiversity Research** for his crucial work in understanding uncertainty and improving decision-making in conservation.

Burgman has created a suite of methods and tools to help conservation planners make the right decisions. His innovations handle uncertainty and unmeasurable risks, make conservation solutions more robust and protect endangered species from the unexpected. His solutions have now been adopted by The World Conservation Union (IUCN) and the Nature Conservancy.

Dr Rod Fensham and Russell Fairfax of the Queensland Herbarium won the **Sherman Eureka Prize for Environmental Research.** Over ten years, the researchers have methodically developed a scientific foundation to measure and understand the fate of Queensland's native rangelands. Their work, and their science advocacy, gave the Queensland Government the information it needed to create stronger laws on land clearing.

'Fensham and Fairfax looked outside the square,' says Brian Sherman, President of the Australian Museum Trust and sponsor of the prize. Starting with explorers' reports, old diaries, half a century's worth of aerial photos and many other sources, they were able to identify the real changes that had occurred in natural vegetation and to search for the causes of those changes.'

Rod Fensham and Russell Fairfax. Stuart Humphries, Australian Museum

'Collectively, their work forms a comprehensive, compelling and sophisticated chronicle. It represents a significant increase in our understanding of how to protect bush and grasslands.'

Mike Young and Jim McColl from CSIRO Land and Water in South Australia have applied their environmental economics skills to water management, winning the **Australia Eureka Prize for Water Research**. Their ideas underpinned the development of a National Water Initiative, a scheme promoting productivity, sustainability and efficiency of Australia's water usage.

They have developed better ways of managing water rights and allocation. The major application of their research has been in the Murray-Darling Basin – the heartland and economic powerhouse of rural Australia.

By allocating water entitlements as 'shares' and distributing these shares via a central, bank-like accounting system, the inefficiency of current 'piecemeal approaches' is neutralised. Water usage can be managed effectively like any other economic commodity. Shares make it clear that, like the stock market, water availability may change. A series of licensing initiatives manages how 'water shares' are used, ensuring usage is economically and environmentally sustainable.

The Victorian Sustainable Schools program won the **Department of Environment and Conservation Allen Strom Eureka Prize for Sustainability Education.** Started as a pilot in 2001 with just eighteen schools, today over 160 schools across the state are engaged in best-practice sustainability education.

More information:
Eureka Prizes:
www.austmus.gov.au/eureka/index.htm

Sponges, such as this cold-water species found off Tasmania, are yielding unique compounds with great potential for cancer and viral treatments. Graham Blight

marine-source, for example, we might need to harvest 20 000 tonnes of a particular sponge per year to meet the global market need and this is ecologically unsound,' Dr Battershill said.

This recent work provides the solution by taking the genes responsible for manufacturing a cancer-fighting chemical produced by a seasquirt, and placing them in an easy-to-culture bacterium, which now produces the chemical. 'Using this methodology, we need only one small collection of the seasquirt to obtain a long-term supply of the chemical, which has potential for the treatment of certain types of lymphoma,' said Dr Paul Long of London University.

'The work succeeded in record time because of the unique collaboration between an ecologist, a biochemist, a chemist and a molecular biologist. The facilities at the Australian Institute of Marine Science, and their access to the Great Barrier Reef to collect the seasquirt played a vital part in this study,' Dr Long added.

The team is now refining a universal cloning technique to produce other high-value marine products, particularly those with exceptional therapeutic potential for which clinical development has stalled from a lack of a renewable supply.

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