



What's New at the Frontiers of Science, Technology and Exploration

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Jellyfish Joyride

Most people aren't too fond of jellyfish, so it's ironic that our actions are causing their numbers to explode at record rates. The problem is twofold, according to University of Queensland scientist Dr Anthony Richardson, who recently worked with Australia's Commonwealth Scientific and Industrial Research Organisation to release a report on burgeoning jellyfish numbers.

The first issue, he says, is fertiliser run-off from the farming industry. When the run-off interacts with phytoplankton, the phytoplankton bloom just like plants on land, giving zooplankton a lot more food to eat. And zooplankton just happen to be the meal of choice for jellyfish. But as well as boosting food sources, fertiliser run-off is also killing off fish. "Once the phytoplankton bloom dies, it falls to the bottom of the sea and then it's broken down by bacteria which use up oxygen.

Using up that oxygen leads to what we call a dead zone," says Richardson. Fish can't survive in dead zones because they are active swimmers requiring healthy oxygen supplies, whereas jellyfish have no trouble drifting in low-oxygen water.

Richardson also believes that another major cause of jellyfish proliferation is commercial overfishing of species that feed on zooplankton. "When you take out the fish, you not only take out the predation control on the small jellyfish, but you let their major prey of zooplankton increase and there's more food for the jellyfish," he says. His real worry is that jellyfish can form what he calls an "alternative stable state," where their numbers increase to the point that they become predators of fish eggs and larvae, replacing fish as the dominant species. That's one jellyfish party no one would want to be invited to.

PHOTOS: GETTY IMAGES/AP; Y. TANIGUCHI, NIU FISHERIES COOPERATIVE



An explosion in numbers of giant Nomura jellyfish in 2003 caused problems for fishermen off the coast of Japan.



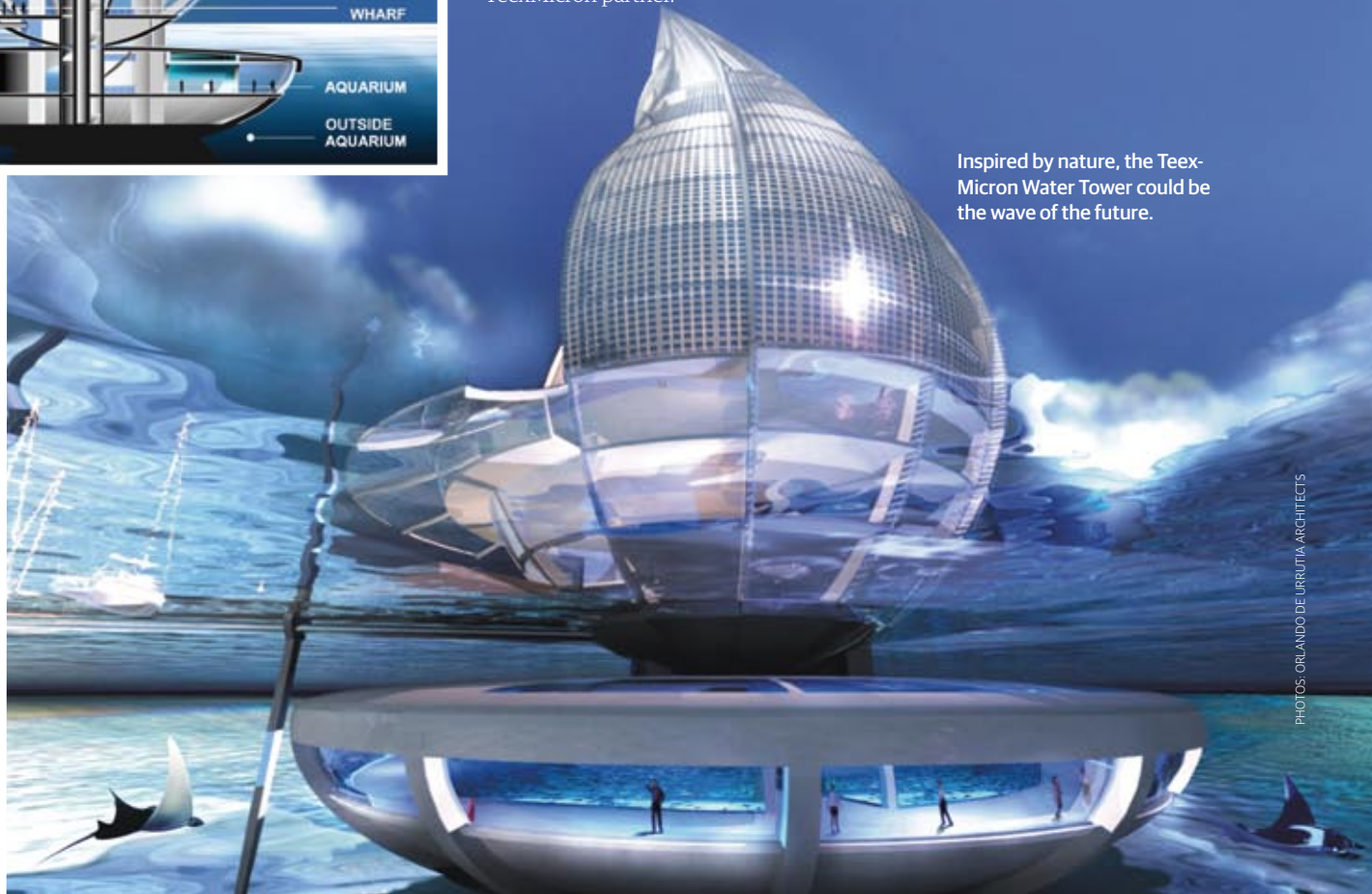
Turning Air into Water



Living in a giant raindrop that produces water out of thin air might sound like something from the pages of a fairytale. But thanks to the artistic vision of Spanish architect Orlando De Urrutia and the technical know-how of the TeexMicron consortium, this fantastical building may soon be rising out of the water off the coast of Saudi Arabia.

Known as the TeexMicron Water Tower, the structure is coated in photovoltaic glass panels which not only help produce power, but work in conjunction with the building's internal airflow patterns to generate humidity. Moist air will be fed through a series of atmospheric water generators, resulting in drinking water that is actually purer than bottled water. The generators are essentially dehumidifiers that run through a seven-stage reverse osmosis process.

Because the ecofriendly tower will be built over the sea, it will also contain a desalination system that will generate clean water for its residents for bathing, washing and watering plants. Enough water will also be generated to supply 1,500 nearby homes. As for the building's use, that's entirely up to the purchaser: "It's sort of an à la carte, made-to-order design. We can expand it or squeeze it down according to [the buyer's] specifications. It's essentially a teardrop shell that provides all the bio-environmental systems. But as far as what the owner of the building wants to do with it, it's up to them," says Gary Lloyd, chairman of WaterMicron, a TeexMicron partner.



Inspired by nature, the Teex-Micron Water Tower could be the wave of the future.

PHOTOS: ORLANDO DE URRUTIA ARCHITECTS

FACTS ABOUT JELLYFISH

- largest species can reach a diameter of 2.5 metres
- have been around for over 650 million years
- can reproduce sexually and asexually at different ages

Zip Strips

You might not think that your electric toothbrush has much to do with saving the world, but a system being developed in South Korea uses a similar kind of technology to help bring electric cars into mass circulation.

Electric toothbrushes charge through an electromagnetic process called induction, in which contact between two metal coils doesn't need to be made; it is enough for them to be in close proximity. By implanting power strips into roads and putting an onboard charging system into vehicles, researchers at the Korea Advanced Institute of Science and Technology hope to put the phenomenon to use on city streets.

Because their vehicles



can charge while driving or idling at traffic lights, the researchers say they "can travel long distances with no limitations, employing only one-fifth of the battery capacity of existing electric vehicles."

A facility has been set up at the institute's Daejeon campus where golf carts are zipping along on the strips. Testing will begin later this year in Seoul, Hangbok City, Dongtan New Town and Jeju.

BITE THIS!

Everyone knows that the way to kill a vampire is by plunging a wooden stake through the heart. But a brick in the mouth? Forensic archaeologist Dr Matteo Borrini of Florence University, Italy, believes his latest find proves just that.

Unearthing a mass grave on the Lazzaretto Nuovo island, north of Venice, dating back to the Venetian plague of 1576, he found a skull with a brick between its jaws. Borrini puts this treatment of alleged bloodsuckers down to a lack of understanding of the process of decomposition. When villagers reopened graves to bury more dead during periods of plague, they would see that the



vampires had “eaten” the shroud around the mouth - in reality, it had simply decomposed.

“The *nachzehrer*, a specific kind of vampire whose legend was born in Kashubia, Poland, would eat his shroud and in a magic-evil way would create more plague,” Borrini says, referring to a book by Philippus Rohr, published in 1679, that describes how bricking a vampire to death was a popular tradition.

“It said that putting something inedible in the vampire’s mouth would kill him; in this way, he wasn’t able to eat the shroud and would starve to death,” says Borrini. No need to sharpen those stakes then.

THE FUTURE'S BRIGHT

A fifth Beatle could someday make the White Album even whiter - only this beetle hails from Southeast Asia. The *Cyphochilus* beetle has a brilliant-white shell, whose structure scientists hope to mimic to produce lightweight paper with a brighter coating.

The startlingly white colour comes from just one thin layer on the beetle. Professor Pete Vukusic from the University of Exeter in England says: "Very many systems can give you great white, like snow. But if you took the same amount of snow as is present thickness-wise in the beetle shell, then it would be pretty much transparent."

Vukusic says the reason a layer that's ten times thinner than a human hair can produce this unique optical effect is that the particles in the beetle's shell - filaments of a protein called chitin - are arranged randomly. White appears the way it does because all the visible wavelengths of light are reflected back to our eyes. "This beetle has evolved the ability to separate the scattering centres in an optimal way. There's just enough - but not too much - space between the scattering centres," he says. The technology could also find a home in ceramics and even in helping dentists to get your smile just the right shade of gleaming white.





CATCHING CRIMINALS

Illegal logging costs timber-producing countries around US\$10 billion a year in lost revenue, according to the World Bank, so it's no surprise they've been compared to Columbian drug barons by Julian Newman of the Environmental Investigation Agency. But a new DNA tracking system being developed by Singapore-based Double Helix Technologies could help axe their activities.

The company is compiling the world's first "genographic" database of Merbau trees - a heavily harvested species found in Indonesia and Malaysia - by recording leaf DNA and corresponding GPS coordinates from legal logging camps. It then hopes to extract DNA samples from wooden furniture and match it to entries in the database to confirm whether or not the wood was logged legally. Double Helix CEO Kevin Hill says their testing method is currently accurate enough to tell what site a particular wood product has come from, but will eventually be able to distinguish between trees on opposing riverbanks.

The two main challenges they face are extracting viable DNA from wood that has been processed, and gaining access to the camps, which Hill likens to the "Wild West". But their system could fight ecocrime on an even bigger scale, he adds. "Timber products are just the tip of the iceberg. There's coffee. It can work with rare truffles from one particular region in France. It can apply to any plant life. If we make this work in the timber industry, we can [apply it to] more boutique forestry products, a lot of them equally under threat," he says.

Timber barons beware!

DESPOTIC DELUSIONS

Dictators aren't known for rational thinking, so it is not surprising that many of them have been deeply superstitious men.

From 1957 to 1971, **François "Papa Doc" Duvalier** exerted brutal control over Haiti with the use of a group of men called Tonton Macoutes. This band of thugs wore sunglasses day and night, only reinforcing the belief that they were zombies Duvalier raised from the dead using voodoo.



In Burma, **General Ne Win** who ravaged his country from 1962-1988, was a devotee of *yadaya-che*, an arcane Burmese practice of controlling one's destiny. This reportedly led him to engage in odd practices, such as walking over a bridge backwards and circling his village nine times while riding in an aircraft seated on a wooden horse.

Notorious Iraqi ruler **Saddam Hussein**, whose mother was a part-time fortune teller, also had a deep belief in the supernatural. During his life it was believed that Hussein could conjure genies as personal slaves. He also reportedly wore a "magic stone" that protected his life and steered him safely through multiple assassination attempts. However, it seems the stone's protective powers ran out on December 30, 2006, when the real-life bogeyman was executed.

