December 11, 2001

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Danger Sniffer

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Danger Sniffer

Ever wondered how a lobster is able to sniff a rotten fish or other tasty meal from afar?

Scientists at Stanford, Bowling Green and the University of California at Berkeley have. And, their studies may someday help with the design of hazardous-materials sensors.

Like many creatures, lobsters pick up odors with antennalike appendages, called antennules, which are covered with tiny hairs that are sensitive to chemicals. The scientists studied how this process works in the Caribbean spiny lobster and reported their results in the journal Science.

For their experiments, they built a kind of Big Mouth Billy Bass version of a spiny lobster, consisting of an epoxy-filled lobster shell with a motor-driven mechanism to which antennules could be attached.

This way the researchers could mimic the way the lobster moves its antennules — with a quick downward flick, followed by a slower return motion — as odor- bearing water passes.

But in the experiment, the researchers used dye rather than odorants so they could see the results.

The downward flick, it turns out, is important. It is quick enough to trap water in the microscopic hairs on the antennule. The return motion is too slow for more water to enter the hairs, so the water remains trapped until the next flick.

What is more, the water contains a "signature," in effect, of how the odor-causing chemicals are dispersed in the water. The researchers are not sure how or if the lobster's brain is able to decode such signatures, but the basic technique may prove useful in developing sensors to determine, for example, how a hazardous chemical is dispersing in a plume of water or air.

Parting the Water Plants are remarkable for a lot of things; not the least is their ability to split water with sunlight.

Not every organism can do that. Take humans, for instance — they've been trying to do the same thing for years, with little success.

But now comes word from Japan of an advancement in the photocatalytic splitting of water into hydrogen and oxygen. The technique has a long way to go, but it may one day be a way to use sunlight to create abundant amounts of hydrogen gas for fuel.

Photocatalysts that can split water have been around for decades. But they work only with the sun's ultraviolet rays, limiting their practicality.

Efforts to create catalysts that work with visible light have failed for two reasons: either they don't absorb enough photons or they absorb enough but are unstable.

Now scientists at two Japanese research institutes have come up with a visible-light catalyst that absorbs plenty of photons and is stable.

As in previous efforts, the researchers, who described their work in Nature, used a semiconductor material that is doped with another element to create the photocatalysts. They found that an indium-tantalum-oxide material doped with nickel did the trick.

So far the researchers have been able to convert less than 1 percent of the energy in sunlight efficiently.

Much work remains to be done in producing semiconductor materials that can use more of the sun's energy.

Saving a Butterfly There is some good news for butterfly lovers from the West Coast. The Fish and Wildlife Service has granted the immediate protection of the Endangered Species Act to the Carson wandering skipper, a small butterfly found only in northeastern California and northwestern Nevada.

The ruling has the effect of postponing several water projects that would have lowered ground water in the area, affecting salt grass, where the butterfly finds its food. The ruling will also give the agency time to put a recovery plan together.