

Shrimp eyes could inspire new DVD tech

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The eyes of the mantis shrimp are unique in the animal world for their ability to detect circularly polarized light. (Roy Caldwell) The unusual eyes of the mantis shrimp could inspire engineers to create the next generation of optical computers and media, like DVDs or CDs, scientists say.

The mantis shrimp of the Great Barrier Reef in Australia has the most complex eyes scientists have ever found. The shrimp have 12 different types of cells for perceiving colour, while a human has only three.

The shrimp's eyes can move independently of each other, and each eye has three different zones that can focus on an object, so it can perceive depth with just one eye.

As well, the mantis shrimp can distinguish between different forms of polarized light, light in which the waves are constrained to a single plane. The lenses of cameras and sunglasses often contain polarizing filters.

The shrimp can also detect circularly polarized light, where the waves travel on a helical corkscrew path. No other animal is known to detect circularly polarized light. (Some modern 3D movies are projected using circular polarization filters to achieve the effect.)

Nicholas Roberts of the University of Bristol in the U.K. has found that the shrimp's eyes contain light-sensitive cells that can convert circularly polarized light to linearly polarized light, and vice versa.

The cells, called rhabdoms, serve the same function as components inside CD and DVD players and other optical equipment, called quarter-wave plates, Roberts said.

However, while manufactured quarter-wave plates can switch between polarization states in one wavelength, or colour, of light, the cells in the shrimp's eyes can do it across the light spectrum from near-ultraviolet to infrared.

"Our work reveals for the first time the unique design and mechanism of the quarter-wave plate in the mantis shrimp's eye. It really is exceptional — outperforming anything we humans have so far been able to create," said Roberts, in a statement.

Beautifully simple

The light-sensitive cells are arranged in tubes and each cell has a slit in

the top that polarizes the light as it passes through.

"What's particularly exciting is how beautifully simple it is," said Roberts. "This natural mechanism, comprised of cell membranes rolled into tubes, completely outperforms synthetic designs."

Biologists aren't sure why the mantis shrimp needs such sophisticated optics in its eye. One theory is that it helps the shrimp find and catch prey by allowing it to see more clearly underwater.

Another theory is that the shrimp can send messages to each other in circularly polarized light, such as sexual or warning signals that wouldn't be visible to other animals, especially predators.

Roberts said the mechanism behind the shrimp's eye could inspire a new generation of optical data storage devices.

It wouldn't be the first time a crustacean's eyes inspired new technology. The spherical, wide-angle eyes of the lobster inspired the design of an X-ray space telescope that can see the entire sky at once.

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biodiversity is a great thing, we can all agree on that. However, this does not mean that species should all be kept from extinction. That is called stagnancy, which is not part of evolution. Evolution includes constant extinction and modification of living things. If we stopped trying to keep the world exactly as we found it, nature could get along with the job of evolving, and we could have less of a negative impact on our world.

Since we are now causing extinctions at about 100 times the background rate I don't think that a lack of them is a problem right now or for the foreseeable future.

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at 8:21 PM ET I think that little shrimp is actually smiling for the camera.

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at 7:48 PM ET They snuffly, biodiversity is a great thing, we can all agree on that. However, this does not mean that species should all be kept from extinction. That is called stagnancy, which is not part of evolution. Evolution includes constant extinction and modification of living things. If we stopped trying to keep the world exactly as we found it, nature could get along with the job of evolving, and we could have less of a negative impact on our world. Change is wonderful, natural, and should be embraced.

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