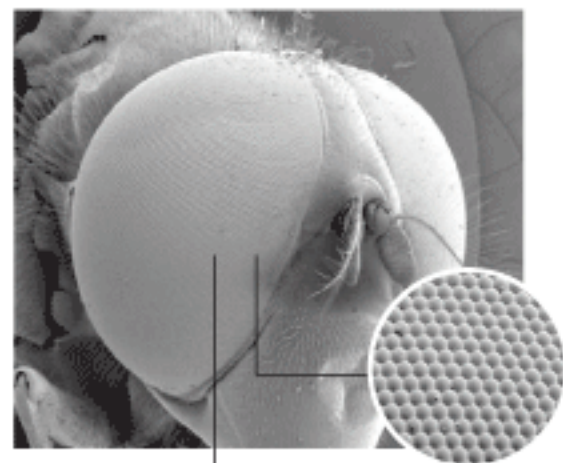


In the Lab, a Dazzling Feat of Vision, Complete With 8,370 Lenses

Inspired by the compound eyes of insects like bees, a team of scientists at the University of California, Berkeley, have devised a method of manufacturing pinhead-size artificial compound eyes, each containing thousands of light-guiding channels with their own

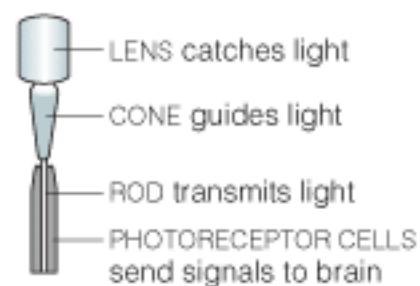
miniature lenses. These artificial eyes could have widespread photographic, military and medical applications. Here is how the researchers did it. *AL GRANBERG*

COPYING FROM NATURE'S EXAMPLE



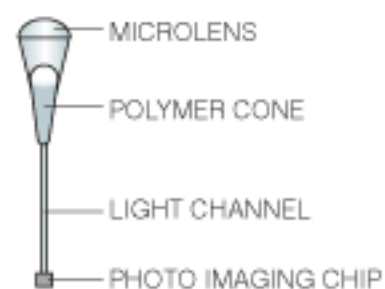
Many insects, like the fly above, have eyes made of thousands of hexagonal lenses at the top of light-catching structures called ommatidium. Scientists mimicked the eye of a bee to make the artificial eye.

NATURAL OMMATIDIUM



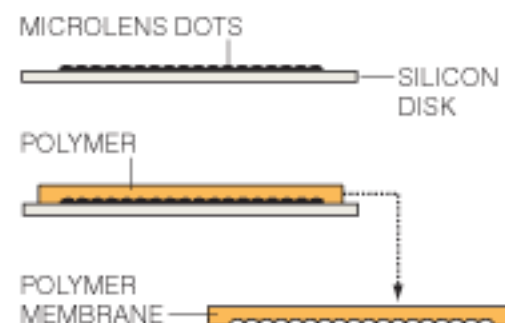
ARTIFICIAL OMMATIDIUM

Designed with parts that function like those in the natural version.

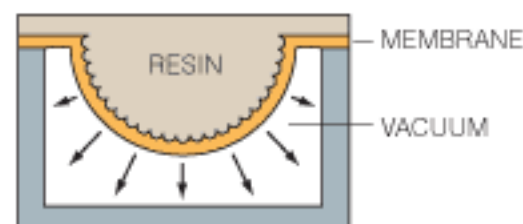


MAKING THOUSANDS OF LENSES AT ONCE

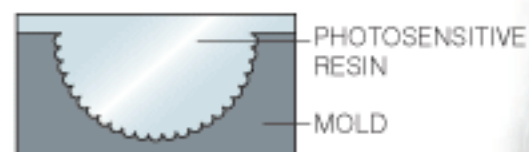
1. Polymer is poured over a pattern of microlens dots that are arranged on a silicon disk. The polymer hardens into a flexible membrane.



2. A vacuum bends the membrane into the shape of the eye. The membrane is then filled with resin to make a mold.



3. A second mold is made from the first one. Photosensitive resin is poured into it to make the eye.

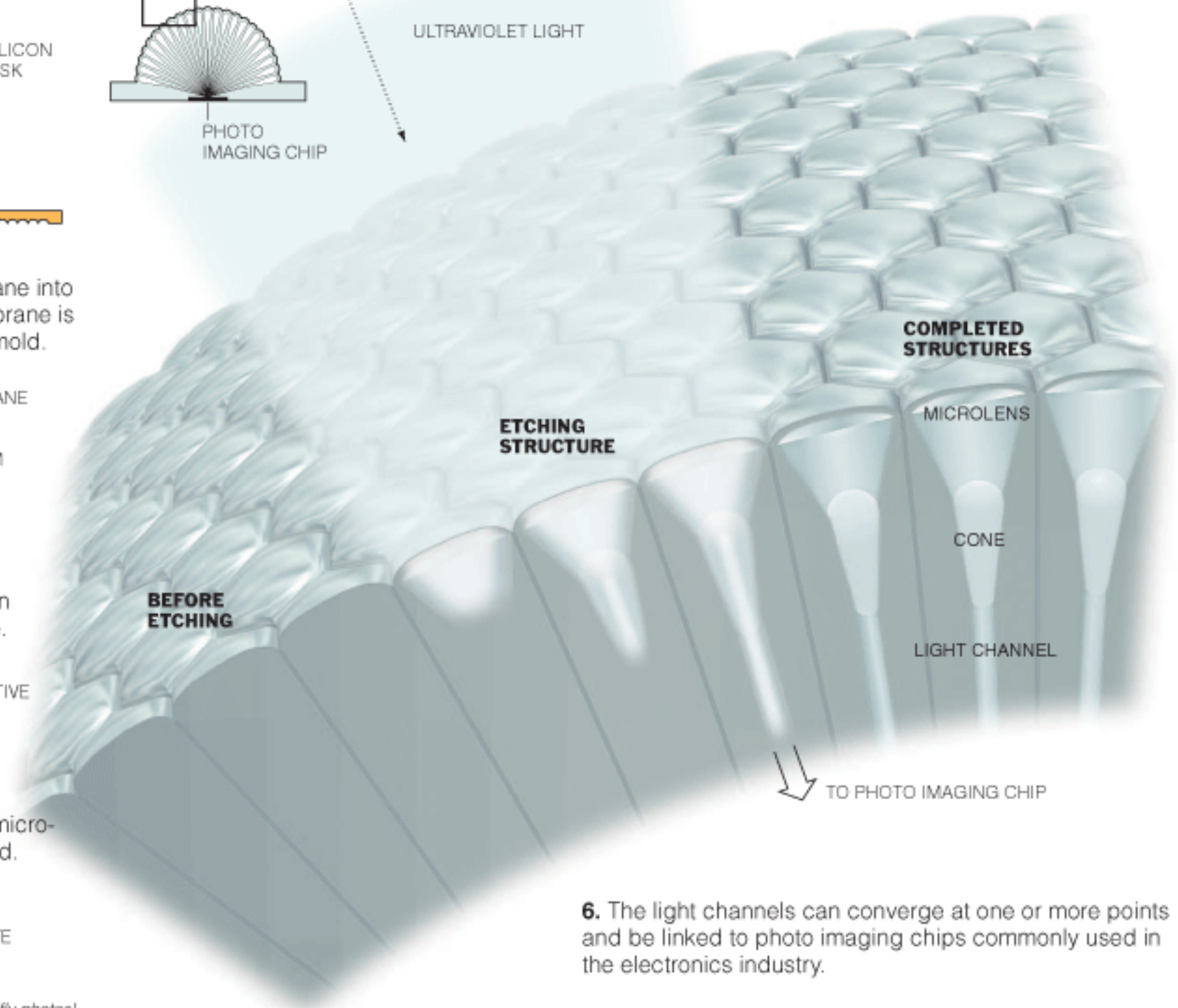
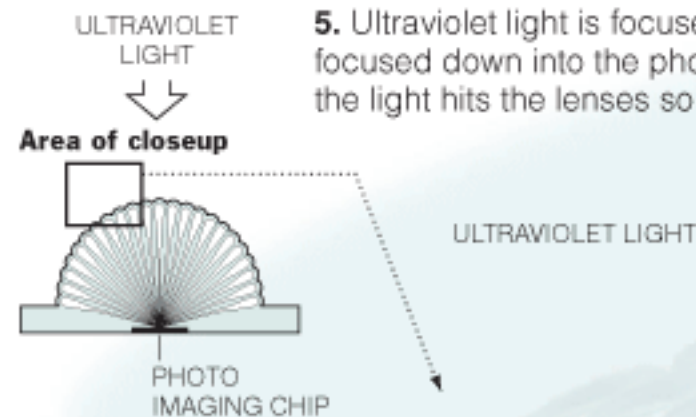


4. The artificial eye, with 8,370 microlenses, is released from the mold.



USING LIGHT TO COMPLETE THE EYE

5. Ultraviolet light is focused on the newly cast eye, caught by each microlens and focused down into the photosensitive resin. Scientists control the angle at which the light hits the lenses so that channels are etched toward the center of the eye.



6. The light channels can converge at one or more points and be linked to photo imaging chips commonly used in the electronics industry.