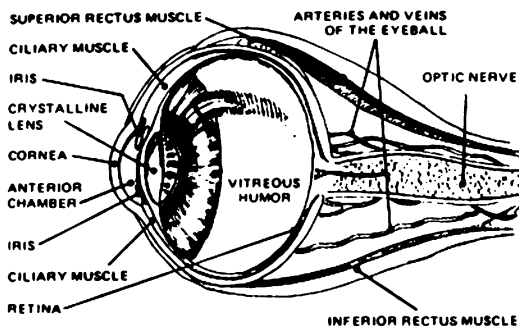
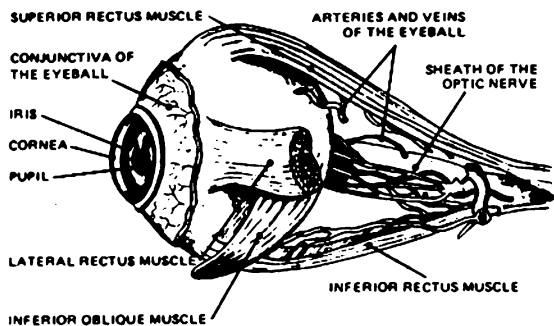


# THE AMAZING EYE

One of the most astounding objects in all nature is the eye. Yet there is not one but many different types of eyes,—all made on different structural and optical principles. On this page four of them are illustrated.

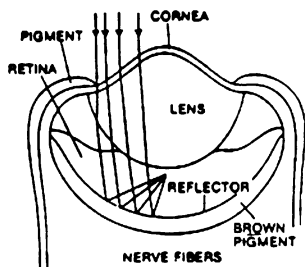
## THE HUMAN EYE

An illustration can only hint at the marvelous complexity of a living organism or its various parts. Consider the human eye, diagrammed above, with its carefully designed muscles to move the eye about, arteries and veins to nourish the entire structure, cornea to admit light, lens to focus it, retina to catch the picture, and optic nerve to pass it on to the brain.



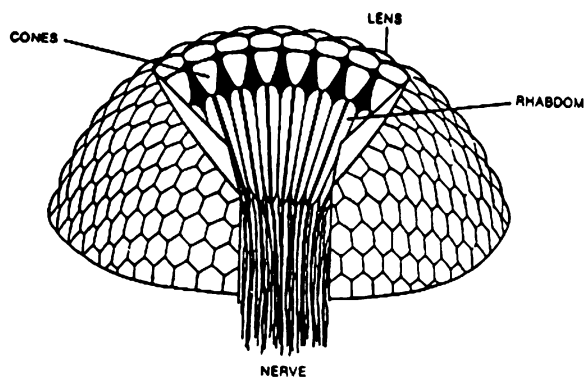
## THE SCALLOP EYE

A scallop is a bivalve mollusk (a two-shelled clam-like creature). In people, their eyes are in their head, and light, passing through the lens, goes across a clear area (the humor) to the retina. But in the scallop, the eyes are located along the outer part of the shell. Light entering one of their eyes passes through the lens (and through the retinal) to a refractor (or reflector) behind the retina. This refractor has a mirror-coated front and a dark brown backing to emphasize the mirror-like qualities. The refractor bounces the light rays back onto the concave-shaped retina which is located next to the lens. As it does so, it focuses them. How could chance selection and harmful mutations accomplish this extremely delicate task?



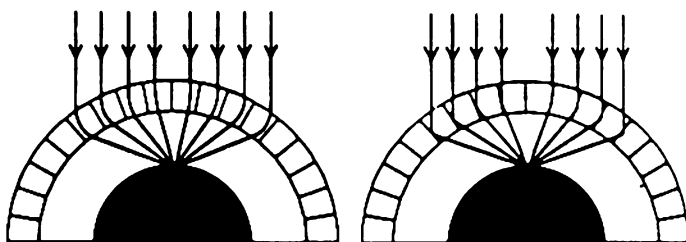
## THE COMPOUND EYE

Compound eyes are most commonly found in insects. The illustration below clearly shows that the housefly, and similar insects, have eyes which are as complicated as those which we have. It is essentially a structure with thousands of tiny eyes to provide maximum visibility in such a tiny structure as the eye of an insect. In daytime insects, each of the thousands of lenselets focuses light directly onto its own set of photoreceptor cells. In nighttime insects, the light is marvelously bent continually as it passes down a (fiber optic?) tube—thus focusing all the light from all the eyes onto a single point on the retina! Illustrated just below is the daytime insect method. The nighttime insect use the method shown at the bottom of the page, whereby light is bent continually.



## THE MACRURAN CRUSTACEAN EYE

There are three different types of compound eyes. One is in diurnal (daytime) insects, a second in nocturnal (nighttime) insects, and a third type in crustaceans of the suborder Macrura. These include lobsters, shrimps and crayfishes. The eyes of these creatures consist of a hundreds of mirror-lined tubes which refract light onto a single spot on the retina. It was not until 1975 that anatomists discovered that the macrurans use an array of mirrors to accomplish the focusing task. This is complicated in the extreme! But the shrimps are not proud of their accomplishment, because they did not make their eyes. They would not have the slightest idea how to do it. On the left, below, is a diagram of the light-bending nighttime insects, and on the right, the mirror-lined tubes of the Macrura.



NIGHTTIME INSECT EYE

MACRURA EYE