

## THE EVOLUTION OF THE EYE



The human eye is an exquisitely complicated organ. It acts like a camera to collect and focus light and convert it into an electrical signal that the brain translates into images. But instead of photographic film, it has a highly specialized retina that detects light and processes the signals using dozens of different kinds of neurons.

Charles Darwin acknowledged in *The Origin of Species* (the 1859 book detailing his theory of evolution) that it might seem absurd to think the eye formed by natural selection. He

nonetheless firmly believed that the eye did evolve in that way, despite a lack of evidence for intermediate forms at the time.

Direct evidence has continued to be hard to come by. Whereas scholars who study the evolution of the skeleton can readily document its metamorphosis in the fossil record, soft-tissue structures rarely fossilize. And even when they do, the fossils do not preserve nearly enough detail to establish how the structures evolved.

Still, biologists have recently made significant advances in tracing the origin of the eye by studying how it forms in developing embryos and by comparing eye structure and genes across species to reconstruct when key traits arose. The results indicate that our kind of eye (the most common type across vertebrates) took shape in less than 100 million years, evolving from a simple light sensor for circadian (daily) and seasonal rhythms around 600 million years ago to an optically and neurologically sophisticated organ by 500 million years ago.

More than 150 years after Darwin

published his groundbreaking theory, these findings remove decisively the idea of irreducible complexity and beautifully support Darwin's theory. They also explain why the eye, far from being a perfectly engineered piece of machinery, exhibits a number of major flaws: these flaws are the scars of evolution.

Natural selection does not, as some might think, result in perfection. It tinkers with the material available to it, sometimes to odd effect.

[Adapted from «Evolution of the Eye» by Trevor D. Lamb, *Scientific American* (June 27, 2011).]

### Answer the following questions.

- A) What does the retina do?
- B) How did scientists discover the origin of the eye?

The human eye.

