The first reflecting telescope was invented in 1663 by James Gregory, but was never popularised because the mirrors were too difficult to manufacture at that time. A slight variation on the principle, the Newtonian telescope, was first recognised in 1672 by its namesake, and was a most dramatic step forward in the observation of the stars. Even today the Newtonian telescope is perhaps the most economical and popular instrument of amateur astronomers. The Schmidt catadioptric telescope was not devised until 1930, and is a variation on the Newtonian telescope. In a Schmidt telescope, light first strikes a corrector plate that is essentially a lens, and then strikes a concave mirror. The reflected light is focused upon a film plate within the column of the original light beam. One of the principal purposes of the initial lens in the Schmidt telescope is to eliminate spherical aberration, but a simple bivalve mollusc had this elegant design as much as 500 plus million years ago, and still uses this system.

When you envision scallops, you probably imagine the painting of Aphrodite’s birth from the sea foam on a giant scallop before she walked ashore in Cyprus, or more simply you think of butter, garlic, and white wine, but this creature has several curious ocular features that are not found elsewhere on earth and are surprisingly elegant.

The eye of *Aequicostata irradians* (and other scallops of the genus *Pecten*) is based on the photoreceptors. Its mirror is close to the split between vertebrates and invertebrates, at least phylogenetically close to the split between our ancestors and obtained their ciliary photoreceptors are ciliary cells and invertebrate photoreceptors are photoreceptor cells that are microvillous. This classical, vertebrate photoreceptor contains photoreceptor cells that are microvillous. These protochordates were probably developed shells during the Cambrian explosion and may have done so as a protective measure, it is interesting to speculate that the last common ancestor that preceded the scallops also contributed to those creatures that later became the protochordate—pikala and later amphioxus. These protochordates were probably ancestors and obtained their ciliary cells from a predecessor.

Hence, the scallop may stand evolutionarily close to the split between vertebrates and invertebrates, at least based on its photoreceptors. Its mirror optics, and beautiful appearance (as well as its delicious flavour!) would make Aphrodite proud.

These photoreceptors fire when light goes off! The distal retina (or anterior retina in an AP direction and immediately behind the lens) responds in a more typical fashion and fires when stimulated by light. Through elegant work, it has been suggested that scallops use the information from the proximal retina to determine orientation to or away from light. The information from the distal retina is sensitive to directional stimuli and responds to moving objects. There appears to be some utilisation of an image by this image. Predator avoidance would be highly likely as these species can “swim” by jet propulsion. Scallops accomplish this by using their adductor muscle (the portion served in fine restaurants) to rapidly close their shells and thus produce a jet stream of water.

Cover image by Bill Capman, PhD, Augsburg College (www.augsburg.edu/biology).

I R Schwab
University of California, Davis, Department of Ophthalmology, Sacramento, CA, USA; irschwab@ucdavis.edu