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Ignorance and Mystery
Gale Rhodes

I am a **structural biologist**, which means that I seek an understanding of how molecular STRUCTURE produces biological FUNCTION. More broadly, I seek connections between chemistry and life, with special regard for the distinction between ignorance and mystery. As an example of this distinction, imagine an object in your field of view, say, a dark loon, silhouetted beyond breakers on the bright winter ocean. I can tell you a detailed scientific story about the light that comes to my eye from this scene, a tale that begins with photons being focused on my retina by a proteinaceous lens. At the retina, the photon energizes a small organic molecule (which came into my body, by the way, in the form of vitamin A, perhaps from a bite of carrot). This molecule starts a cascade of events, many of them little more than changes in molecular shapes, that results in an electrical impulse that travels to my brain. Along the way, branching impulses are formed, and other impulses converge and mingle, and so this signal reaches the brain in a complex form, many nerve cells speaking at once, in varied rhythms. But in their mixed voices, my mind finds a sort of harmony: I say to myself that I see a loon, and I have to catch my breath.

Scientific analysis has revealed many of the molecular mechanisms that underlie perception. With each passing year, my scientific story of seeing a loon can become more detailed. Some would say that science is removing the mystery from it. But I disagree. Science is a means of distinguishing ignorance from mystery, of separating them, as in a distillation. Some aspects of perception are still shrouded in ignorance, and will one day be revealed. But no amount of science will remove all mystery from even the commonplace act of perceiving. For instance, at one end of the process is the photon, a little bit of pure mystery. We know the laws of photon behavior in great detail, but there is no adequate theory of the photon, no explanation of its action. There are the laws that we call quantum mechanics, which predict its behavior with stunning accuracy, but there is no quantum theory to explain why it acts that way. At the other end of the story there is me, the one who sees the loon and feels the excitement of kinship with an animal whose identical ancestors foraged off such shores tens of millions of years before my ancestors, hardly recognizable as such, came down from trees. Where, in all this molecular machinery, is the *me*, the breathless observer? In the photon and in the self who, by collecting photons, sees the loon, lie mystery before which science stands powerless. I believe that this view of science makes science more accessible and less fearsome to students. In this light, students can see that science cannot overpower the inherently mysterious, but can distill away ignorance to reveal, not dispel, mystery.

Biochemistry and Personal Beliefs
Gale Rhodes