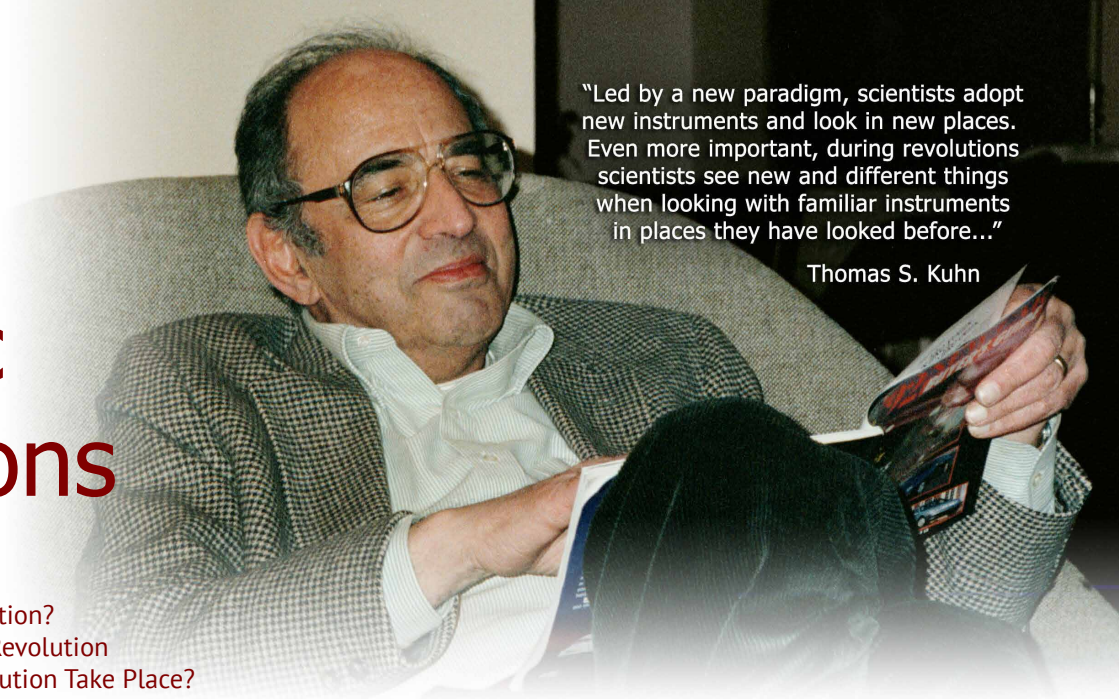
4

Scientific Revolutions



"Led by a new paradigm, scientists adopt new instruments and look in new places. Even more important, during revolutions scientists see new and different things when looking with familiar instruments in places they have looked before..."

Thomas S. Kuhn

4.1 What is a Scientific Revolution?
4.2 The Steps for a Scientific Revolution
4.3 Why Will a Scientific Revolution Take Place?
4.4 From Where Will the Next Revolution Come?

Scientific Revolutions shape the world in which we live, they represent an integral part of the history of science, and in this chapter, we talk about how important they are. The last Scientific Revolution happened a long time ago; it's very likely no one knows what a revolution in natural science even looks like. Revolutions in *technology* happen frequently, and just about everyone can relate at some level. The computer, the internet, smart phones, and drones each revolutionized the world, imposing permanent change as they disrupted societal norms. When will we next experience a Scientific Revolution?

This chapter answers this and other Scientific Revolution questions, because a revolution is coming—a Universal Model revolution!

4.1 What is a Scientific Revolution?

Thomas S. Kuhn & Scientific Revolutions

Well-known scientific historian and philosopher, Thomas Kuhn wrote *The Structure of Scientific Revolutions* in 1962, explaining the process of how science advances, or why it does not. Gaining surprising notoriety, Kuhn's book became a standard when discussing scientific progress. Now available in 16 different languages and at over a million copies sold, it remains required reading for many science history courses. In his book, Kuhn coined the now common word '**paradigm**' to define a collection of beliefs that form a model or a perspective of any subject. It represents consensus thinking in a general sense.

Figures 4.1.1 and 4.1.2 illustrate two ways in which science advances, 'Linear Science' or 'Scientific Revolutions.' Both include the discovery of scientific knowledge and an increase in wisdom, including new natural law. Linear scientific advancement implies a constant, steady increase of knowledge based on discovery. Today, most textbooks portray modern science advancing in knowledge based on a steady linear progression. The Science Revolution process illustrates discovery at significant points along the way, which brings rapid and significant change only occasionally, each time raising the aggregate of human knowledge through a **paradigm shift**. Kuhn reveals that the development of natural science coincides with these paradigm shifts, which he calls ***revolutions***:

"By disguising such changes, the textbook tendency to make the development of science **linear** hides a process that lies at the heart of the most significant episodes of scientific development." Bib 33 p140