CHAPTER 33

CONCLUSIONS—WHERE DO WE GO FROM HERE?

The scientific mode of thinking can be described as a type of philosophy—a mode and structure of analysis. Its basis is the assumption that an analytical interpretation of the evidence of the senses is the best means of understanding our world. It does not rely heavily on the sensual or emotional side of human experience (passion) as a guide to interpretation, because it has no means of weighing, experimenting with, or falsifying the meaning of passion, trances, or other emotive experiences, and it considers to be irrelevant, evidence based on immeasurable factors such as faith, communication with the dead, extrasensory perception, telekinesis, or other considerations beyond human experience. Note that the operative words are "considers irrelevant": the scientific approach does not reject out of hand such evidence; rather, the scientist states that he or she cannot evaluate such evidence and therefore cannot incorporate it into a logic of the workings of the world. For science is about the mechanics of the world, how the world is put together and how it functions. Science does not consider why the world is here.

Humans have always used the rules and logic of evidence, even in the most adamantly faith-based procedures known to mankind. What were miracles but evidence of the existence of a superior being? And trials by ordeal in all faiths were an effort to establish evidence. They ranged from the African ordeal bean, in which someone accused of a crime was made to eat a bean containing a deadly neuropoison to torture of the accused in a court of Puritans, or the Inquisition. In each case the survival of the accused was evidence of innocence, and death was evidence of guilt. The rule was still evidence, but the logic included assumptions of untestable forces ranging from the power of God to unknown forms of energy. As long as they remain untestable, they are beyond the reach of science and the scientific approach. They may exist—before the existence of the microscope, bacteria were inconceivable, and before the discovery of radioactivity, the idea that a rock could explode and release enormous amounts of energy was unimaginable. Scientists simply say that we know of no forms of energy and no mechanisms by which ghosts, for example, could exist and come to haunt the earth. We can attempt to detect their existence, by setting up numerous detection devices and, above all, attempting to reproduce the conditions in which they appear. If we fail in spite of our best efforts to capture an unequivocal and measurable sign of their existence, they remain an unproven

hypothesis, currently falsified by evidence supporting the opposing hypothesis that ghosts do not exist. The evidence supporting the hypothesis that ghosts do not exist is weak, since it consists entirely of negative evidence: the ghost was not recorded by a camera, motion sensor, heat sensor, magnetic field detector (such as a metal detector), microphone, or any of the numerous other means we have of detecting distortions in the environment. Any well-planned and executed experiment that detected a ghost would in a single step overturn the hypothesis that ghosts do not exist, but we would then have to move to the next step of logic—how do they exist? What is their source of energy? Of what are they composed? Science merely tells us where to place our money in a bet, and in this case the best wager is that ghosts do not exist.

It is also very important to remember that morality is a human trait but that science is amoral. By "amoral" we mean that science does not have morals, that it is neutral to morality. Science is not "immoral," or against human codes of morality. It is amoral, in the sense that the value of any human action or judgment is a human decision for which science can provide evidence but not interpretation. A scientist can state when the genome of a new human being is created and at what point the nervous system is developed to the level at which we can presume that an infant feels pain or has a thought, but the value of that information, meaning whether or not the state or the church assumes interest and responsibility for that life, is a value judgment made by societies, and the conclusion has varied from society to society and throughout history. Likewise, we can provide evidence that evolution has occurred and our analysis of this evidence can inform our predictions as to what will happen if we raise the carbon dioxide level in the atmosphere (global warming) or what we will lose if we destroy great ecosystems such as the tropical rainforests. We can likewise interpret how genes will and will not spread in our population, or calculate how many people this planet can hold. But we cannot make decisions for a human society. The society must assess its own values, and in this endeavor all participants have a say. Sometimes societies make very bad decisions, and sometimes they make excellent ones. The role of the scientist is to tell us how it works and therefore to predict the consequences of specific actions. Hopefully you, the citizenry, will be sufficiently well-informed to understand the importance of evidence, logic, and falsification, and you will evaluate the data, and make moral and compassionate decisions on that basis. If you can do this, then we as scientists have succeeded in our mission.

REFERENCES

http://www.unesco.org/science/wcs/eng/declaration_e.htm

American Association for the Advancement of Science, 1993, Benchmarks for Science Literacy (Benchmarks for Science Literacy, Project 2061) (Paperback)

Chalmers, Alan 1999,What Is This Thing Called Science: An Assessment of the Nature and Status of Science and Its Methods (Paperback)

Rothman, Milton A. 2003 Science Gap: Dispelling The Myths And Understanding The Reality of Science, Prometheus Books, New York

Tambiah, Stanley J, 1990, Magic, Science and Religion and the Scope of Rationality (Lewis Henry Morgan Lectures) (Paperback) Cambridge University Press, Cambridge, UK

STUDY QUESTIONS

1. Compare the concepts of "truth," "evidence," and "logic" in science and in other fields.
2. To what extent can scientific facts be considered to be absolute? To what extent can the interpretation of those facts be considered to be absolute?
3. What major scientific subjects will have the most political or moral impact in the future?
4. Suppose it were well established that people born in the month that you were born had a medical problem that would cost insurance companies so much that the cost of everyone's insurance policy would be increased 10%. What would you do? Would your response be the same if the problematic month were something other than your birth month?
5. List the three most important ideas that you have learned from this book; give the evidence that backs the idea; and explain why you consider it to be so important.